THE HISTORY AND CONSTRUCTION OF OYSTER RIGGINGS USED ON THE CHESAPEAKE BAY

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PREPARED BY

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FOR INITIATION INTO THE BETA CHAPTER OF MARYLAND OF TAU BETA PI FRATERNITY

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OUTLINE

THE HISTORY AND CONSTRUCTION OF OYSTER RIGGINGS USED ON THE CHESAPEAKE BAY

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HISTORY OF OYSTERING IN MARYLAND

Certain old paintings found in Virginia substantiate the belief that the intripid explorer, Captain John Smith, was the first white man in America to eat the luscious bivalve. These pictures represent the Indians bringing oysters to Captain Smith and the early settlers of Virginia.

This quaint yet important incident was but a prologue to the drama of the oyster, which has played such a vital part in the Chesapeake Bay country. Each successive incident became more a stirring and more robust. In the early seventies of the nineteenth century activities assumed proportions of chaotic lawlessness. This period produced many fearless seafaring men. Little did Captain Smith realize that the delicious sea food given him by the Indians would in later years cause battles, bloodshed and the loss of lives.

No doubt the greatest period in the history of the oyster industry in Chesapeake Bay was during the time of greatest oyster production, when the great fleets of pungies, schooners, skipjacks, and bugeyes, maned by rough and fearless skippers with shanghaied crews, roamed the bay, taking oysters from the restricted zones in a very lawless fashion. These men, taken as a class, formed perhaps one of the most depraved bodies of workmen found in the country. They were gathered from jails, workhouses, penitentiaries, and the lowest dens of the city. They were principally whites and

mostly foreigners, representing practically every European nation, often unable to speak more than a few words of English. They were worked from dawn until sunset and many succumbed to exposure on the wintry, icy decks; some of those who escaped this fate were paid off by a jibe of the boom, left on some unknown shore or island, or killed with a belaying pin.

In reviewing the history of the oyster industry in Maryland records give the first packing house established in the city of Baltimore in 1836 and the first steam packing house in 1848. The demand for oysters was still small at that time; even up to 1850 only 1,300,000 bushels a year were taken, and it was not until after the Civil War that great activity in the oyster business commenced, caused by the increased demand from other States and improved shipping facilities. It was in 1866 that a license was first required for the taking of oysters with tongs, scrapes, and dredges, and a police force to check poaching was not created until 1868, when the oyster crop harvested from the waters of Maryland reached 7,500,000 bushels.

This was the beginning of the period of great fleets of dredging vessels--perhaps as many as two hundred--and they gradually increased in numbers until in 1880 there were seven hundred boats engaged in taking oysters from the bottom of the Chesapeake. The greatest production was reached in 1885, when 15,000,000 bushels were marketed.

The decline of oysters since 1890 has been gradual but almost continuous. A slight change in the production due to a heavy catch of spat (young oysters), which sent it up to a million bushels or two, occurred now and then, to be followed by a still greater decline, until in the year 1929 the production scarcely reached two million bushels.

During the period from 1870 to 1880 no serious thought had been given to maintaining the supply of oysters in Chesapeake Bay. The ever increasing fleet of sailing craft and other types had worked with practically no restrictions, taking and destroying oysters regardless of size, and when the demand came from Northern markets for seed, they ruthlessly stripped the rocks, and shipped Northward millions of bushels.

Following a bumper crop in 1875, there was a gradual decline, and in 1878-1879 Lieutenant Francis Winslow, U. S. N., was detailed by the United States Bureau of Fisheries to survey the oyster bars of Tangier and Pocomoke Sounds, in Maryland and Virginia, to determine their extent. Winslow's report showed that oysters were still plentiful at that time, although the production had declined. His report, however, had the effect of arousing serious thought on the part of the Maryland Legislature, which in 1882 appointed a special commission to study the industry and to make recommendations for corrective measures. This commission was composed of three members--Dr. William K. Brooks of John Hopkins University,

James I. Waddell, and William Henry Legg of the Eastern Shore.

Dr. Brooks, an outstanding biologist of his day, recommended in the strongest terms the return of the oyster shells to the natural rocks, to provide cultch for the young oyster to grow upon. This valuable report of the commission was thrown into the discard; the outburst of disapproval over the shell planting proposal was unanimous from tidewater Maryland, and there was no action taken by the Legislature. In 1886, however, the Legislature provided for shell planting in a small way, but it was never carried out with any degree of system and the benefits which accrued are questionable.

The State Fishery Force, which was established in 1868 was gradually augmented by additional boats in an effort to enforce the laws and control the oyster fleets and protect the tonging or county waters from raids by the dredging fleet. Two iron steamers patrolled the Bay and the Potomac River and were equipped with rifles and in addition fitted with crescent-shaped sections of iron in front of the wheels to protect the steersman from rifle balls.

The year 1888 was one of the most outstanding in the history of the oyster industry. In reality it marked a turning point in the industry. During the oyster season more dredge boats were engaged in harvesting the bivalve than were before and the Bay skippers were bolder in their disregard of the law. It was during this very period when many crews were shanghied to turn the four men hand windlasses that raised the

dredge from the bottom, for gasoline motors had not been put into practical use until sometime later. The Maryland Oyster Navy had countless encounters with the dredging fleet in forbidden waters which were finally climaxed by the oyster battle of Chester River on December 10.

The battle of Chester River attracted wide notice in the newspapers. This battle was a turning point in the history of the oyster industry. It had the effect of subduing the dredger's activity in the tributary or illegal waters of the State of Maryland, and it was shortly after this that the German Society of Baltimore succeeded in its efforts to have the Government take a hand in preventing the shanghaing of crews on dredge boats.

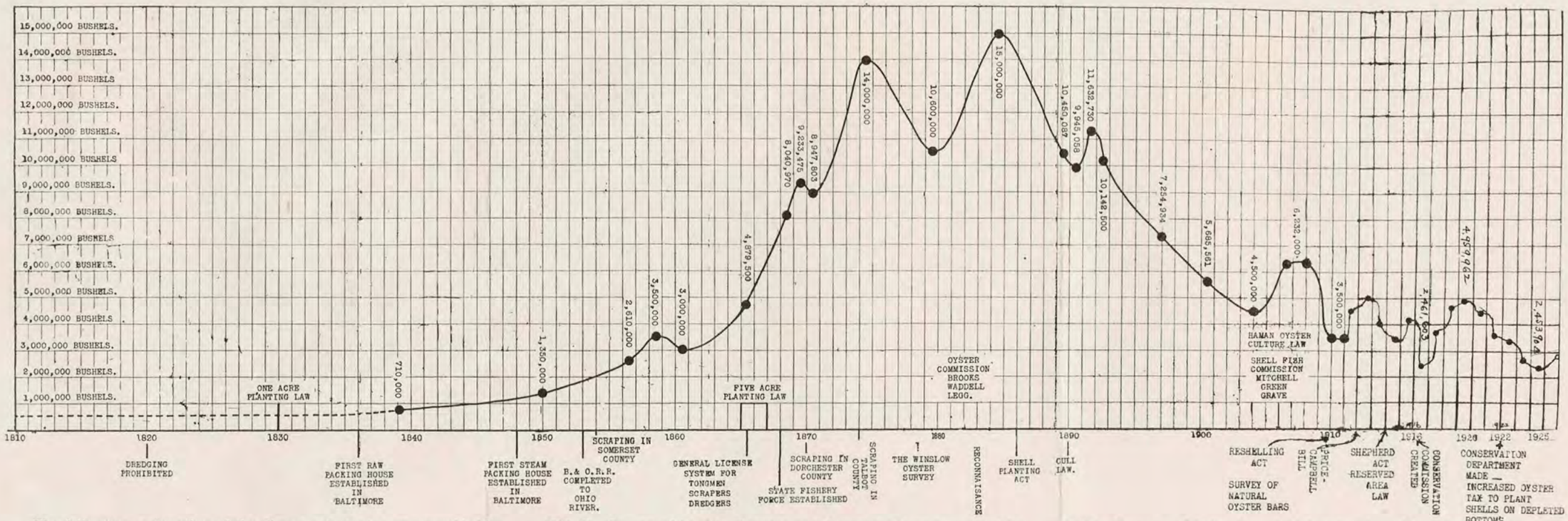
The Maryland Legislature then passed the first important law for the conservation of the oyster. This act was known as the cull law, and it required that all oysters less than two and a half inches from hinge to mouth be returned to the waters of Maryland. Except in the enforcement of the law the catcher was permitted to have as much as five per cent of shells and oysters less than two and a half inches in his cargo. The cull law had done more than any other law to maintain the oyster bars still existing in the waters of Maryland, and if this law could have been augmented by an active shell planting campaign, Maryland's production would be three or four times greater than it is today. This law has become more effective year by year with the decrease in the supply, until today the present cull law, which is three inches from hinge

to mouth, is generally observed. Maryland laws now include a shell-planting law and many tons of shells have been put back into the waters of the Chesapeake in an effort to restore the oysters in abundance and again make Maryland the greatest oystering state in the United States. At the present time Maryland is the fourth largest producing state.

The Chesapeake Bay was the most extensive and prolific oyster territory in the world, today it shows signs of depletion in many places. Efforts are being made to restore the supply thru strict legislation and under the present system, Maryland can have only small planters who may succeed one year and fail another. Holdings are not large enough to warrant the employment of suitable boats and equipment. Most of the oysters will be tonged or scraped after the old fashion, and only in good weather is such work possible. If leases of the grounds should become numerous, much litigation will arise because boundaries are insufficiently surveyed and charted. Prices will rise and fall as many or few bring in their harvest, and these small and poor planters will have the greatest difficulty in protecting themselves against dredging vessels. In the course of time the tonger and the dredger of the natural crop will have disappeared. All opposition to oyster culture having vanished, the Chesapeake, rich with food for an unlimited oyster growth, free from the most destructive of oyster enemies, with its safe and unvarying natural conditions, will prove to be of greater value to the people on its shores than it ever has been.

HISTORY OF OYSTER PRODUCTION AND LEGISLATION IN MARYLAND

Diagram Showing History of Oyster Production and Legislation In Maryland



The following explanation of the diagram footnotes was provided by Swepson Earle, Conservation Commissioner:

1820—First oyster legislation passed, prohibiting dredging in county waters but permitting it in State waters.

1830—First restocking law passed. Known as "One Acre Planting Law." It gave landowners right to take up one acre of bottom adjoining their property for replanting.

1836—First raw packing plant established in Baltimore.

1848—Steam packing plant established.

1856—Scraping legalized in Somerset County with boats of less than ten tons.

1865—Inauguration of license system for tonging, dredging and scraping. "Five Acre Planting Law" passed almost simultaneously.

1870—Scraping legalized in Dorchester County, the Great Choptank and Honga Rivers and in Hooper Straits.

1847—Scraping legalized in Talbot County. Scraping today legal only in Somerset, Dorchester and Talbot.

1878-79—Survey of bars in Tangier and Pocomoke Sounds and in Virginia waters by Lieut. Francis Winslow, U. S. N. Oysters found still plentiful but not so abundant as in earlier years.

1882-83—Reconnaisance of Maryland oyster beds by special Oyster Commission, which reported beds depleted and supply in danger of extinction if conservation measures were not taken. Private and State oyster culture recommended. Peak oyster crop—15,000,000 bushels—came in following year and the report of the commission was ridiculed in many quarters.

1886—Passage of shell planting law requiring State to plant shells for culture. Never carried out efficiently, although sound in purpose.

1890—Passage of cull law, still in force, which requires that any oyster taken which is less than 2½ inches from hinge to mouth be returned to water.

1906—Passage of Haman Oyster Culture Law, providing for survey and leasing of State beds and creating Shell Fish Commission.

1912—Passage of Price-Campbell law to strengthen Haman law.

1914—Passage of Shepherd act, which virtually nullified oyster culture legislation by providing that any bottom resorted to once in five years by oyster fishermen was natural bottom. This was followed by the Reserve Area Law, permitting the closing and planting 1,000 acres for later reopening.

1916—Reopening of reserved area to oystermen and creation of Conservation Commission out of old State Fishery Force, Shell Fish Commission, Fish Commission and Game Warden.

1917—Extension of reserved areas to include 1,000-acre sites in tributary waters to be closed for two years.

1922—Conservation Commission becomes Department of Conservation, with single commissioner at head. Oyster tax increased to produce $18,000 revenue a year. Million bushels of shell since spread on 1,000 acres of depleted bottoms. Depletion stemmed without increase in production.

Year.	Bushels Oysters Inspected. Md.	Out State.	Tonger.	Scraper.	Dredger.
1916	4,120,819	687,585	7299	730	446
1917	2,461,603	366,792	5562	378	309
1918	3,743,638	288,924	3688	402	222
1919	4,592,001	303,096	5232	407	322
1920	4,959,962	323,625	5439	455	324
1921	4,435,186	563,445	6230	533	261
1922	3,687,489	550,000	5543	460	295
1923	3,440,810	643,554	5396	420	362
1924	2,787,047	242,470	5776	389	299
1925	2,453,904	481,038	5156	406	265
1926	.....	.....	.....	.....	.....

Above is a comparative report illustrating the decline in the oystering licences issued and the general decline of the oystering business that has been a characteristic of the business for the past forty years. This decline is even apparent during the prosperous times of the business cycle.

DEVELOPMENT AND DESCRIPTIONS OF THE RIGS USED IN OYSTERING IN THE CHESAPEAKE BAY

SUMMARY

From the time of planting of the colony at St. Mary's City and the colony at Jamestown oysters have been a dependable source of food for people living along the Chesapeake Bay. There was, apparently, no industry in the states of Maryland and Virginia until early in the nineteenth century when, with the development of such nearby cities as Philadelphia, Baltimore, and Washington, there sprang up a demand for oysters which resulted in the perfection of devices for the capture. By 1840 the industry had developed to a point that attracted attention in this country and abroad. However, the peak of production in Maryland's oyster industry was not reached until in the decade of 1880-1890, when in a single year more than fifteen million bushels were produced. During the early part of the decade many crews were shanghaied and later in the decade there were a number of minor oyster wars with some casualties. Because of the ever increasing harvest watermen had come to feel, by this time, that the oyster resources of the Chesapeake were inexhaustible. Since that period, however, there has been a gradual diminution in the supply, with an occasional favorable year, albiet, until the present low level has been reached. There has been a challenge to the best in science and legislature to check the depletion and effect restoration. Legislature in its endeavor to check depletion has enacted laws which have limited the evolution and development of oystering

machinery, however, there were some early developments.

The first implements were crude rakes which gradually developed into tongs. Tongs were not efficient in the very deep waters so an implement called the patent tongs was used in deep water. Dredges were invented to reach the oysters in the deep waters. There have been many types of dredges but all are of the characteristic use and construction. Motors have been used in hoisting the dredges and patent tongs into the boats. The early hand rowed boats were improved on by sail boats and later motor boats. The further development in oystering implements can be inspired only by an increase and upturn in the oystering industry which may come about through planting of cultch and seed oysters on oyster farms sufficiently large and using methods that are not too restricted by state law.

CRUDE IMPLEMENTS

Oysters were first taken from the Chesapeake Bay by hand. The Indians and early colonists were able to wade into the clear shallow waters and pick the bivalves from the bottom. As time continued on the Indians and some of the colonists would dive for the oysters just as pearl divers of today dive. Those of the colonists who could not or would not dive, but wished to get the oyster as a change in diet from the game of the woods and products of their gardens, made crude fork like implements of wood and were able to pull or rake the oysters from the deeper water into the shallower water and then pick them up by hand. Later the fork like implements were improved on and the crude wooden rake was used.

A crude wooden hoe was attached to another hoe by some ingenious colonist and a pair of nippers was made. The nippers were a scissors like arrangement consisting of two wooden handles about seven feet long held together by a pivot or dowl about five feet from the operating end. On the end of each handle was a narrow blunt blade, thus forming true pincers or nippers that would pick the oysters off the bottom when operated from above. The nippers became handy instruments and were improved on by putting teeth in the blade and the result was the first crude small tong. The small tong was improved on by making the handles longer and placing a basket or cradle on the bottom which could gather and hold the

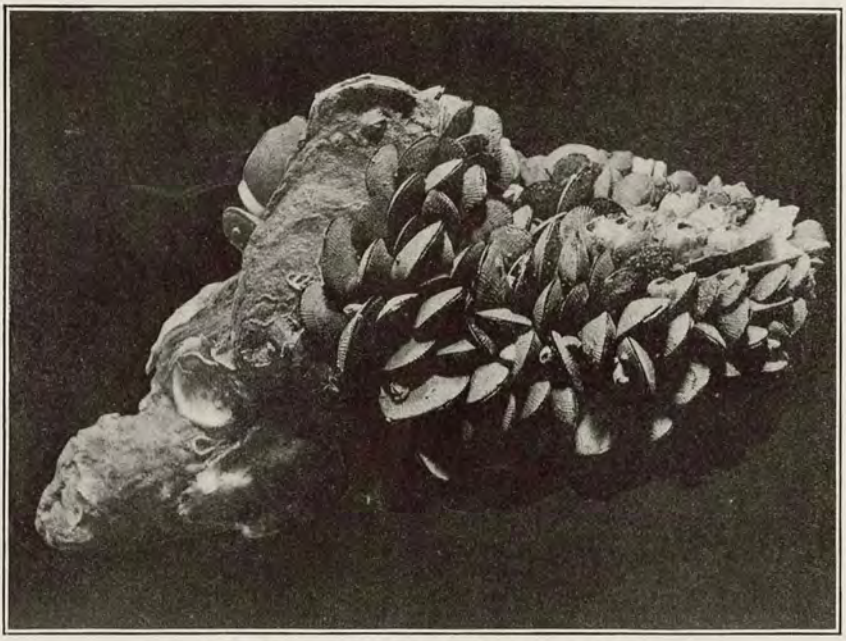


FIG. 1.—MASS OF MUSSELS ATTACHED TO OYSTERS.
(After Moore.)

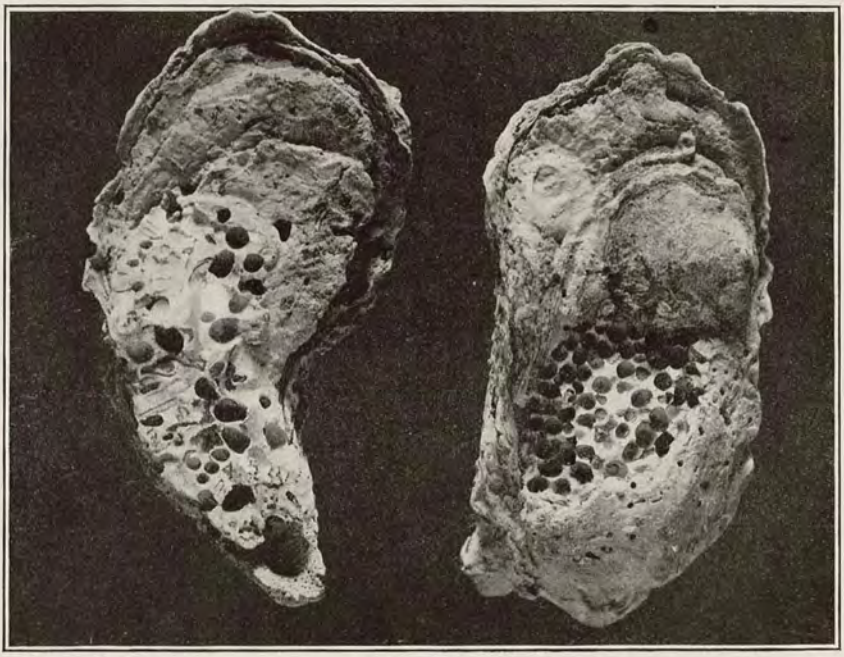


FIG. 2.—OYSTER SHELLS SHOWING PITS AND CHAMBERS MADE BY BORING CLAM.
(After Moore.)

FIG. 1.—TONGING OYSTERS, WORKING THE TONGS ON THE BOTTOM.

(Photo from Prof. E. N. Cory, Maryland State University.)

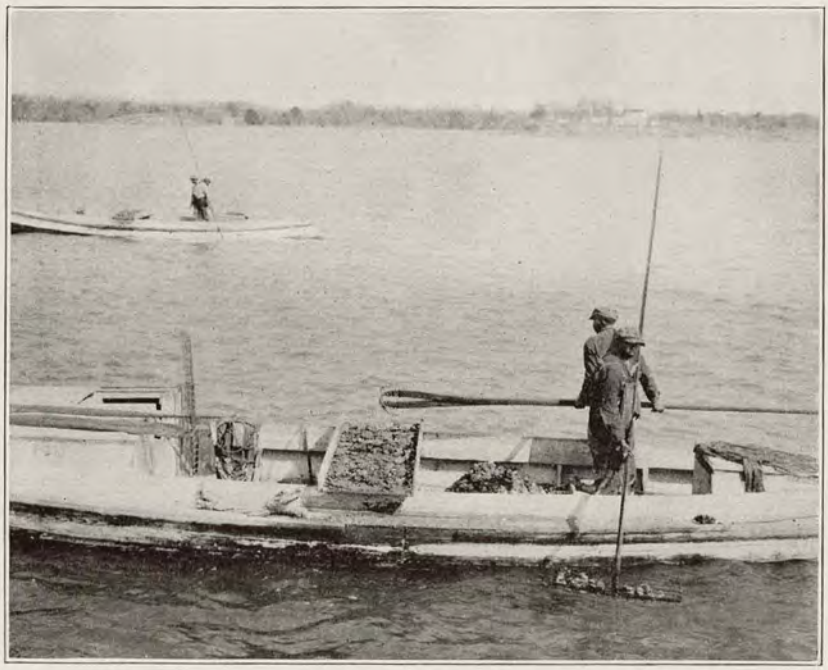


FIG. 2.—TONGING OYSTERS, LIFTING AND EMPTYING THE TONGS.

(Photo from Prof. E. N. Cory, Maryland State University.)

oysters. The tong itself which has hardly been improved on developed from the small tongs.

TONGS AND TONGING BOATS

The ordinary hand oyster tongs are shown in Plate XI. There are two long, flat, smooth, wooden handles about three inches wide and nearly one inch thick bolted, rivited, or pinned together with a wooden pin, scissors fashion, about four and one half feet from one end, leaving the long ends for handles. To the short end of each shaft is secured at right angles a light iron bar about three and one half feet long, bearing teeth, while above this bar are five or six still lighter bars or heavy wires parallel to the bar and attached to the shaft. The ends of the bars or wires are fastened together by short wires. The arrangement on each shaft is made with the teeth sloping inward and when the handles are closed the two are brought together, the whole forming a basketlike affair, three and one half ~~inches~~ feet long and about eight inches or ten inches deep. In operating the handles are worked scissors fashion, and the teeth are forced under the oysters, retained in the basket which is then lifted. Oyster tongs vary in length with the depth of water in different localities. In some places oysters are tonged by hand at a depth of even twenty-five feet.

Various styles of boats are used in Tonging. The pictures shown illustrate the various styles of boats. These

FIG. 1.—HAND DREDGES AND WINCHES FOR HOISTING THEM.

(Photo from Prof. E. N. Cory, Maryland State University.)

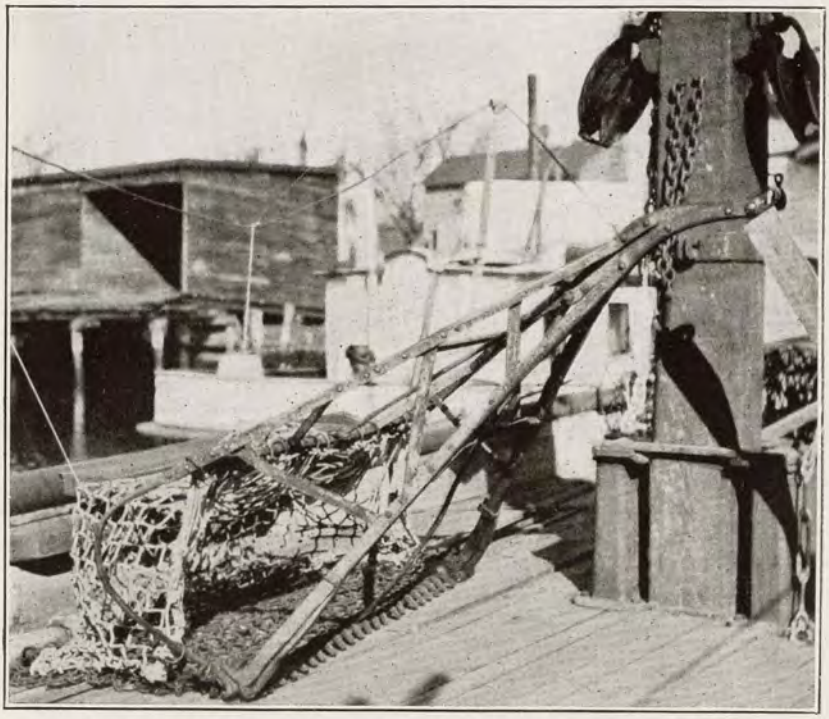


FIG. 2.—MACHINE-HOISTED DREDGE USED IN TAKING OYSTERS.

FIG. 1.—LOWERING THE DREDGE.

(Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 2.—EMPTYING THE DREDGE.

In this case the dredge has been lifted by a donkey engine, part of which may be seen at the right.
(Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 1.—SMALL SLOOP OR "SKIP-JACK" USED IN DREDGING OYSTERS IN CHESAPEAKE BAY.

The dredge shown lying on the roller is raised and lowered by the hand windlass over which the man is stooping. (Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 2.—OYSTER-DREDGING SCHOONER IN CHESAPEAKE BAY.

(Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 1.—OYSTER FLEET OPERATING FROM CAMBRIDGE, MD., LYING IN HARBOR.

Cambridge is only one of the several important oyster centers on Chesapeake Bay. (Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 2.—ONE OF THE TWO LARGEST OYSTER STEAMERS IN THE WORLD, BOTH OWNED BY A NEW ENGLAND COMPANY.

Three dredges lifting 30 bushels each are operated on each side. The capacity of the steamer is 8,000 bushels per day. (Photo from H. C. Rowe Co.)

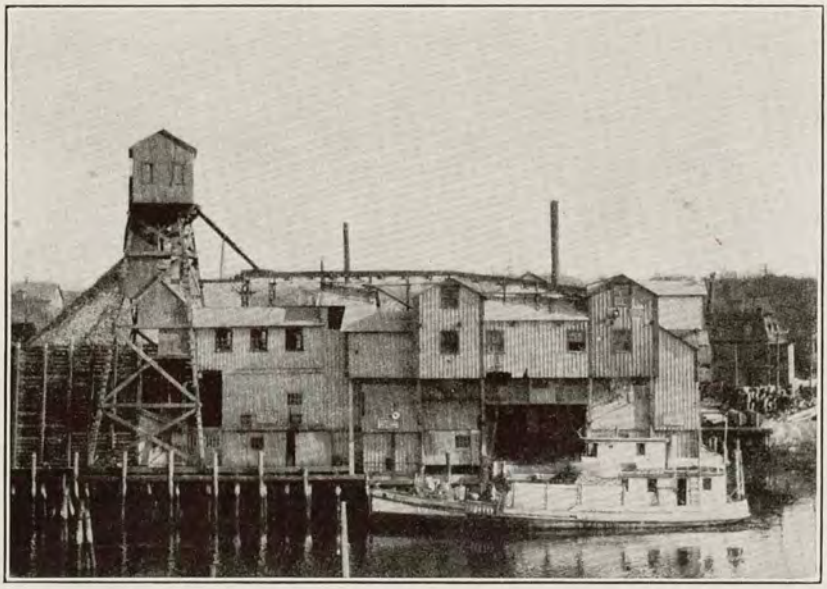


FIG. 1.—LARGE OYSTER HOUSE AT PROVIDENCE, R. I., SHOWING DREDGE BOAT UNLOADING OYSTERS AT RIGHT AND ELEVATOR TO SHELL PILE AT LEFT.

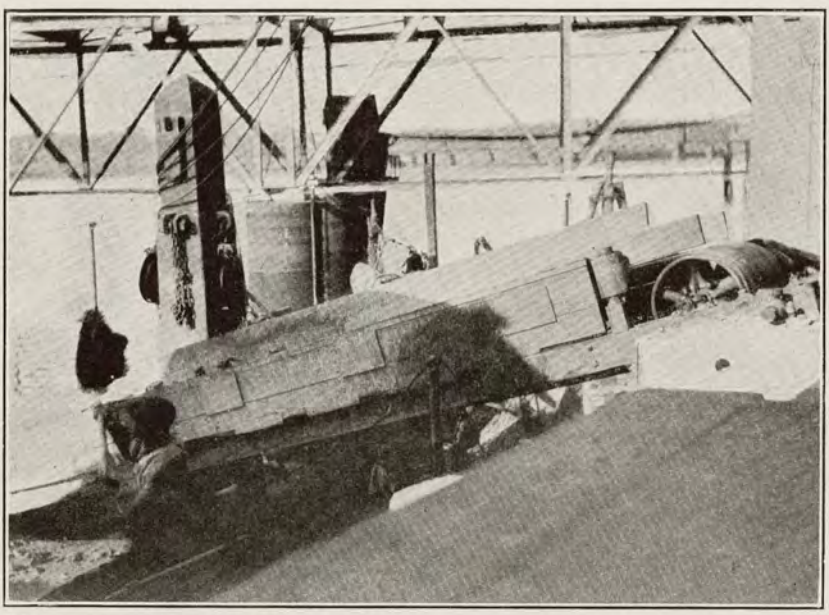


FIG. 2.—UNLOADING OYSTERS FROM THE BOAT AT ONE OF THE LARGE OYSTER HOUSES BY MEANS OF A BELT CONVEYER.

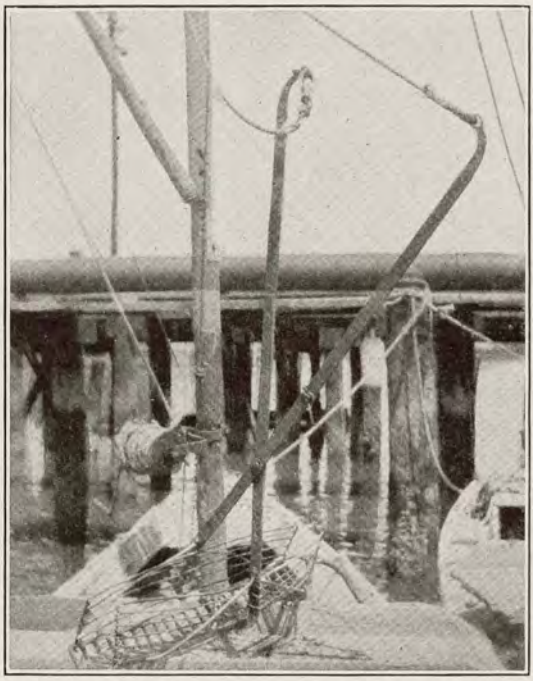


FIG. 1.—PATENT TONGS, USED TO SOME EXTENT IN TAKING OYSTERS IN THE LOWER PART OF CHESAPEAKE BAY.

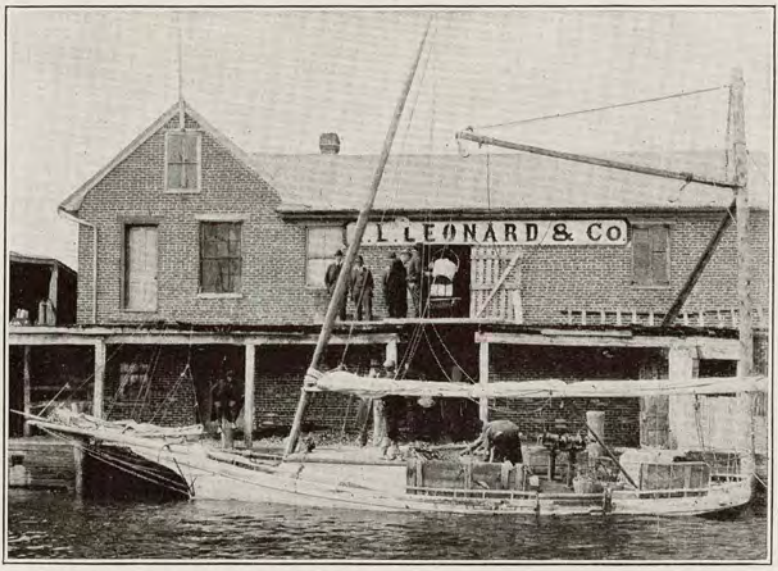


FIG. 2.—UNLOADING OYSTERS BY MEANS OF A CRANE OPERATED BY A DONKEY ENGINE IN THE SMALL BUILDING AT THE RIGHT.

(Photo from Prof. E. N. Cory, Maryland State University.)

FIG. 1.—SMALL SAILING BOAT USED IN TONGING OYSTERS IN QUINNIPIAC RIVER, CONN.

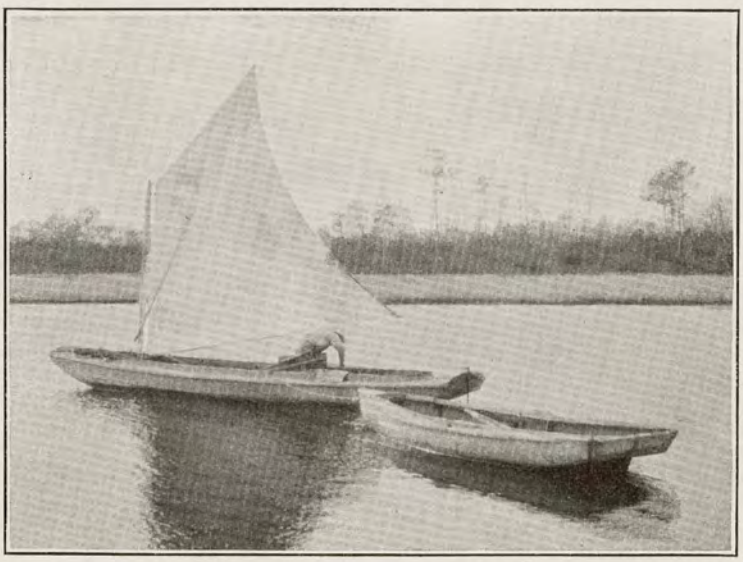


FIG. 2.—SMALL SAILING BOAT USED IN TONGING OYSTERS IN RIVERS ON THE COAST OF ALABAMA.

boats often carry an auxiliary gasoline engine besides the sails. Such a boat is shown on Plate XIV figure 1, returning with a load of oysters which have been tonged. Some gasoline engine powered boats are used without the sails. On these small boats, in compliance with State laws, the oysters are culled on a board placed across the boat as is shown on Plate XI figure 1.

PATENT TONGS AND BOATS

Certain localities in Maryland permit the use of patent tongs on natural bars. Except that their handles are sturdier, shorter and of iron instead of wood, and that the basket feature of the tongs is much larger, patent tongs are made along the same lines as ordinary tongs. Patent tongs are shown on Plate XII figure 1. They are used in waters of depths which commonly employ dredges but, because of police difficulties, in which dredge boats are not allowed to operate. The length of the basket is about forty-two inches. Patent tongs are lowered and raised by windlasses either by hand or by the power of a steam or gasoline driven deck engine, and they cannot be used from a moving craft. In the upper ends of the six foot iron handles are eyes for the attachment of ropes for lowering and raising the tongs. While being lowered the tongs are locked open by the short hook seen on one of the handles just above the center pin. When they strike bottom, the consequent release of the weight of the baskets on the handles

FIG. 1.—SMALL SLOOP USED IN TONGING OYSTERS NEAR APALACHICOLA, FLA., RETURNING WITH LOAD OF OYSTERS, SHOWING OYSTER CANNERIES IN BACKGROUND.

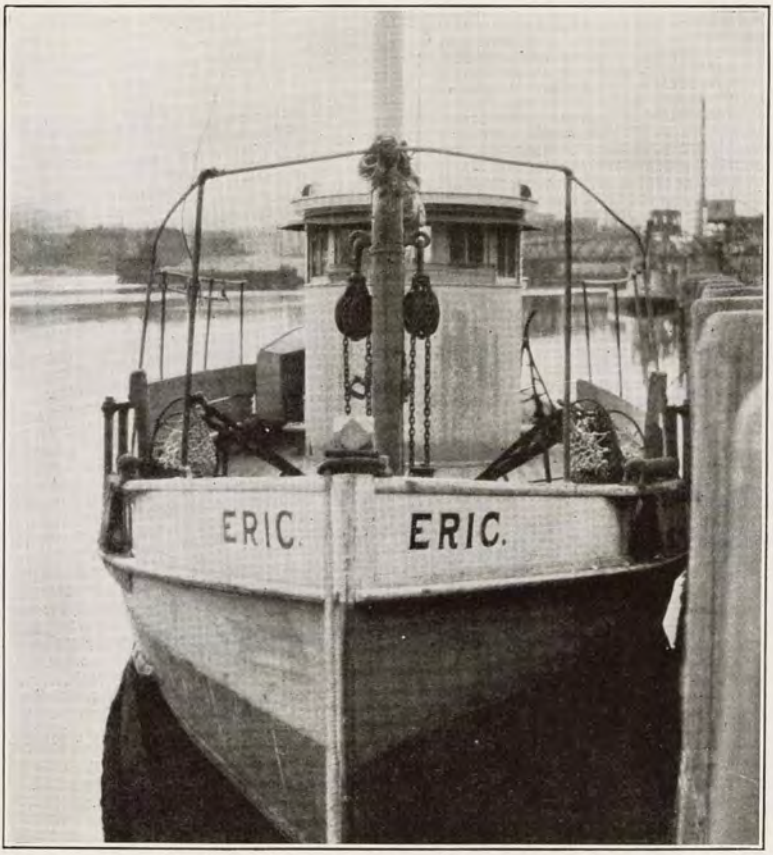
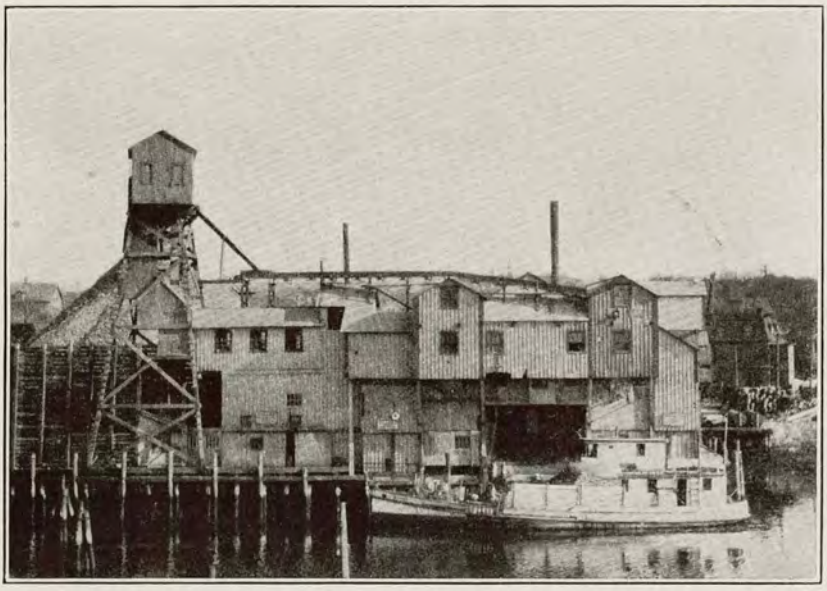


FIG. 2.—GASOLINE BOAT USED IN DREDGING OYSTERS IN LONG ISLAND SOUND.

In the center is the post to which are attached the pulleys through which pass the chains leading to the dredges on each side. When the dredges are being raised and lowered, the chains move over the rollers on the gunwale.



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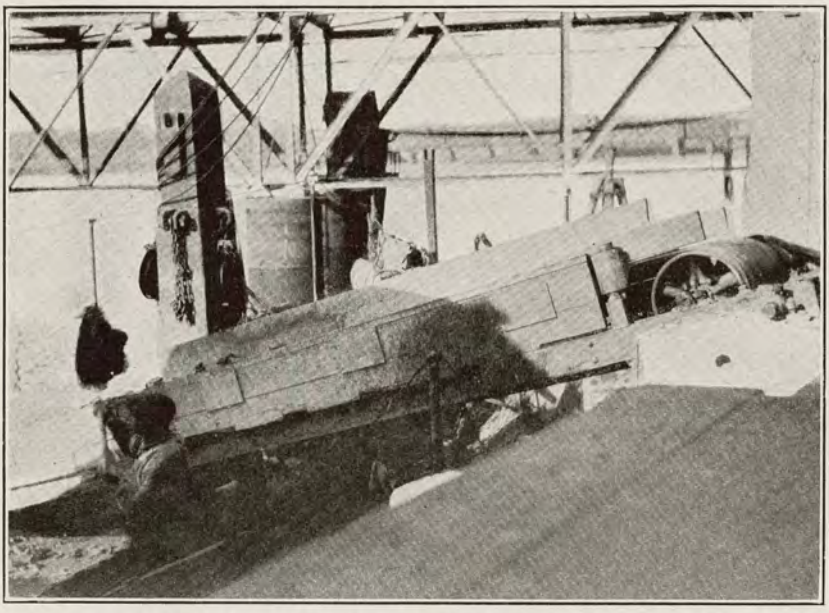

FIG. 2.—UNLOADING OYSTERS FROM THE BOAT AT ONE OF THE LARGE OYSTER HOUSES BY MEANS OF A BELT CONVEYER.

allows the hook to become disengaged. The tongs are then jigged by jerking upon the rope several times, causing the teeth to sink more deeply, and then lifted by the windlass. These tongs have been found very efficient. The boats used in patent tonging and very similar to those used in hand tonging except that in patent tonging the boat is equiped with either a motor or hand operated windlass for lifting the tongs and also a beam, supporting a pulley, which carries the tongs over the side of the boat as illustrated in the figure.

DREDGES AND DREDGING BOATS

Dredges are the most modern improvement in the oystering rigs. Dredging is the common, general and most practical method of harvesting oysters wherever the water is deep enough to operate. Since this is the most efficient method of taking oysters from the bottoms, dredging areas in the Chesapeake were the first to become depleted and barren.

A dredge (Plate XV figure 2) consists of two iron triangular structures, stoutly made and united at their apexes, the lower one of which has a blade-like base of heavy construction and carries stubbed teeth. These triangular structures are held apart securely by two curved bars, one on each side of the dredge, running from the apexes of the base angles of the triangles. From the two bases, or cross bars, and the curved part of the dredge the bag is suspended, the bag being of different designs of cotton rope and iron rings. The rope is used to make the bag more flexible and is meshed. The triangle bearing the teeth, usually wider

and longer than the other one, is the lower part of the dredge. Its cross bar is set at an angle that assures maximum attach for the teeth that it bears. The iron ring part of the bag is attached to this bar so that the metal rather than cotton rope is exposed to the rugged conditions of the bottoms. Dredges run in size from so called "hand scrapes", with a capacity of one bushel, to immense sizes with a sixty inch tooth bar and in which ten or more bushels of oysters may be taken at one haul. In 1926 a resolution was made in the Maryland Legislature to control the size of dredges and make the maximum forty-two inches wide which would be about seventy-five pounds in weight so as not to crush or destroy the oysters on the bottom as some of the heavy dredges cannot avoid doing. Usually the larger dredges are braced with metal bars and rods in several places so that they may withstand "hangs" and other violent strains while being dragged on the bottom. Oft times, and especially with lighter dredges, a"wing" is used to hold the dredge on the bottom. This consists simply of a thin sheet of metal tied in the upper triangle of the framework in such a fashion as to cut downward in the water as the dredge moves forward. The "wing" or "devil dive" was outlawed by the 1927 session of the Legislature of Maryland, however. Very few actual and beneficial improvements have been made on the dredge since its invention. The general description above includes practically all dredges, however, I have inserted some patent copies of various dredges invented or improved on since

1865, at the end of this thesis. The pictures and descriptions are easily understood and would be interesting to read and comprehend. All practical dredges have been of the drag or scraper type but as additional information I have also inserted two impractical types of dredges, one a suction operation and the other a loader operation which were never used in the Chesapeake. State laws have never allowed the use of such machines and they are impractical because they bring up too much mud.

Plate XVI, figure 1, shows a small dredging sloop or "shipjack" under sail on the Chesapeake Bay, the dredge on the port side being lifted and the hand windlass visible beyond it. Heavier dredges than this are operated by the use of a donkey engine placed on the deck of a sailing vessel (Plate XVII, figure 2). Plate XVI, figure 2, shows such a dredging schooner at work. These vessels are propelled entirely by sails, it being illegal to dredge with other than sails as motive power; the engine merely operates the dredge. From one to three dredges are usually operated from each side of the boat, each dredge being raised and emptied in turn. The boat is equiped with the raising mechanism and a roller on the side over which the chain or rope moves in raising and lowering the dredge. Sometimes the oysters are culled on the deck or they may be dumped from the dredge onto a culling table where the oysters are separated from the mud, old half oyster shells, or any other matter brought up from the bottom.

The improvement in dredging in the Chesapeake Bay was the change from the hand windlass to the motor driven windlass. In some parts of the United States steam operated boats have been allowed and proved satisfactory both for towing the dredges and lifting the dredge from the bottom. The first steam driven boat was operated in 1874 since that time many have been used but none on the Chesapeake. Gasoline motor powered boats have been used in some parts of the country very effectively but not in the Chesapeake Bay. Maybe in the future when oyster culture and oyster laws of the bay attract larger capital investments the oystering implements will be of the most modern types and a good industry maybe an incentive for continuous improvements.

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BUREAU OF FISHERIES DOCUMENT NO. 890

ANNUAL REPORTS OF THE CONSERVATION DEPARTMENT OF MARYLAND

MARYLAND FISHERIES PUBLISHED BY CONSERVATION DEPARTMENT OF MARYLAND

SHELL-FISH INDUSTRIES J. L. KELLOGG

THE OYSTER W. K. BROOKS

Much infromation was secured personally from the following men:

SWEPSON EARLE, CONSERVATION COMMISSIONER OF MARYLAND

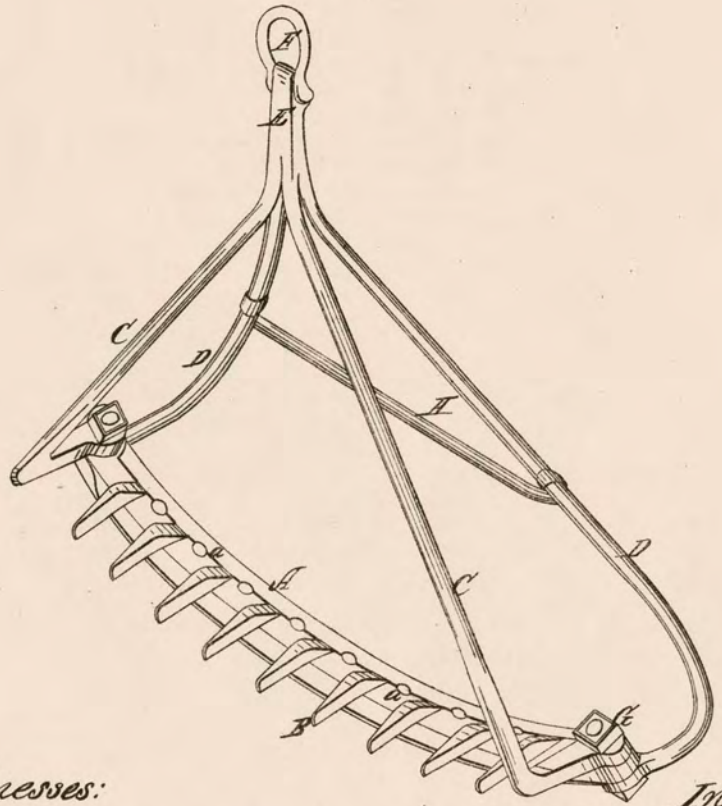
R. V. TRUITT, PROFESSOR OF AGRICULTURE, UNIVERSITY OF MARYLAND

MR. BROWN, SEARCH ROOM U. S. PATENT OFFICE

W. Belbin,

Oyster Dredge

No. 45,904. Patented Jan. 17, 1865.



Witnesses:
Jas. W. Scheffs.
W. E. Jillson.

Inventor:
Wm. Belbin
by his Attys.
Baldwin & Son

UNITED STATES PATENT OFFICE.

WM. BELBIN, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN OYSTER-DREDGES.

Specification forming part of Letters Patent No. **45,904**, dated January 17, 1865.

To all whom it may concern:

Be it known that I, WILLIAM BELBIN, of the city and county of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Oyster-Dredgers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which makes part of this specification, and which represents a view, in perspective, of my improved oyster-dredger.

It is the object of my invention so to construct an oyster-dredger that while its teeth are free to move unobstructedly over the oyster-beds it can also readily be hoisted over the stern of the boat without catching thereon; and to this end my improvement consists in constructing the front rods, which sustain the rake, with such a curvature and so combining them with the other parts of the dredger that they do not obstruct the passage of the rake-teeth over the oyster-beds, and at the same time carry the rake over the stern of the boat without permitting the teeth to catch upon the roller or boat, as hereinafter more fully shown.

The dredger shown in the accompanying drawing consists of a strong wrought-iron bar, A, curved in the arc of a circle of large radius, and having a series of rake-teeth, B, inserted into it on its upper side and projecting in front of the bar, dipping slightly forward, so as to pass under and rake up the oysters with greater certainty. The rake-bar A likewise has a row of holes, *a*, in it, in which to insert the rings to which the oyster-bag is attached.

The rake-bar is attached to a frame consisting of four wrought-iron rods, C D, uniting at their upper ends in a head or socket, E, having an eye in it. A ring-bolt or link, F, is pivoted to this head, so as to play freely back and forth, and to this link the drag rope or chain is attached.

The front rods, C, are straight from the head E nearly to the level of the rake-bar A, at which point they are flattened, as shown in the drawing, so as to present a sharp edge on the advancing side, and bent backward at a right angle, while the rear rods, D, are curved more gradually and to a greater extent than the front ones, and extend beneath the rake-bar A, which is placed between the ends of the front and rear rods, and the whole securely fastened together by a nut and screw, G, or a rivet. The two rear bars are likewise connected by a cross-brace, H.

From the improved form of the front rods, C, it readily will be seen that, while they in no wise obstruct the action of the teeth when the rake is in motion over the bottom, the projection of their curves at the sides of the dredger causes it easily to rise over the roller without permitting the teeth to catch thereon, and thus to deliver the oysters close to the stern of the boat without spilling any.

The dredger operates as follows: A bag to contain the oysters is secured to the back of the rake-bar A by rings in the holes *a*. A rope is attached to the link F and the dredger thrown overboard and dragged after the vessel, the rope passing over a roller on the taff-rail. As the dredger advances the teeth catch up the oysters, which pass back into the bag, and in case of encountering an obstacle the yielding of the link permits the rake to free itself more readily than it would otherwise do, and diminishes the liability of the rake to be broken, bent, or injured. In drawing up the dredger the front rods, C, slide over the roller and protect the rake-teeth from catching upon it, being made to project beyond the teeth especially for that purpose.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

The combination, in an oyster-dredger, of the rake-bar A, front rods, C, and rear rods, D, with the head E and swiveling link F, when the rods C are curved, constructed, and arranged as and for the purposes described.

In testimony whereof I have hereunto subscribed my name.

WILLIAM BELBIN.

Witnesses:

SOLOMON J. MAILHOY,
WALTER MOXLEY, Jr.

United States Patent Office.

THOMAS F. MAYHEW, OF PORT NORRIS, NEW JERSEY.

Letters Patent No. 97,420, *dated November* 30, 1869.

OYSTER-DREDGE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, THOMAS F. MAYHEW, of Port Norris, Cumberland county, New Jersey, have invented certain Improvements in Oyster-Dredges; and I do hereby declare the following to be a full, clear, and exact description of the same.

Nature and Object of the Invention.

My invention consists—

First, in the employment, in an oyster-dredge, of a light inflexible bag of wire gauze, or its equivalent, in place of the usual heavy chain-bag;

Secondly, of certain guards or fenders, arranged beneath the said inflexible bag; and

Thirdly, in bringing the tooth-bar and the said inflexible bag to the front portion of the dredge, and in a peculiar construction of the latter.

The object of my invention is to dispense with the objectionable flexible bag, and to simplify and reduce the weight of the dredge.

Description of the Accompanying Drawing.

Figure 1 is a perspective view of my improved oyster-dredge.

Figure 2, a sectional view of the same.

Figure 3, a view of the dredge as it appears when being drawn over the side of a vessel; and

Figure 4, an inverted plan view.

General Description.

The frame of an ordinary oyster-dredge consists of four bars, welded together at the front, so as to form an eye, to which the operating-rope or chain may be attached, and spread apart from each other at the rear end of the dredge, so that the usual tooth-bar and flexible chain-bag, into which the oysters are raked, may be secured to them.

The chain-bag, owing to its flexibility, always sags downward, and rests upon the bottom of the oyster-bed, as the dredge is drawn forward, so that, although made of the stoutest and heaviest material, the bag soon becomes worn through and unfit for use.

The frame also, in order to sustain the weight of the bag, and to distend it properly, must be much stouter and more complex than if the bag were made of some light inflexible material.

To overcome the above objections, and to consequently simplify and reduce the weight of the dredge, has been the object of my present invention, which I will now proceed to describe.

The general form of the ordinary dredge is retained, but the upper bars of the frame are dispensed with, and the lower bars A A only employed, the latter being welded, or otherwise secured together, at the front end, where there is a link, *a*, and having secured to their rear ends the tooth-bar B, which is furnished with the usual teeth *c*.

In place of the usual heavy bag of S-hooks and rings, I employ a light inflexible bag, *f*, of stout wire gauze, the mouth of this bag being supported by a metal frame, *h*, secured to the tooth-bar, and being protected at the bottom by guards or fenders *i*, which are also secured to the tooth-bar, and which pass beneath and around the said bag, as best observed in figs. 2 and 4, the upper ends of these guards or fenders, after passing around the bag, being attached to the top of the frame *h*.

The frame *h* is attached to the bars A A by light chains *m m*, which determine the angle, in respect to the said bars, of the tooth-bar B and the bag.

When the dredge is dragged forward, it will assume the position shown in fig. 2, the tooth-bar and fenders only resting upon the bottom, the fenders effectually protecting the light material of the bag.

When the dredge is drawn on to the roller X, on the side of the vessel, its teeth *c* will strike on the said roller, and will turn the tooth-bar and bag to the position shown in fig. 3, thus emptying the oysters on to the deck of the vessel, without the usual necessity of drawing the dredge entirely over the roller.

This method of emptying the dredge, which would be impossible with the flexible bag, enables the fenders for warding off the tooth-bar from the roller, to be dispensed with, and much facilitates the operation of the apparatus.

Although I prefer that the frame, &c., for supporting the inflexible bag, should be constructed as above described, yet it will be evident that the bag can be applied with advantage to any of the frames in common use.

Claims.

1. The use, in an oyster-dredge, of a bag, *f*, of wire gauze, or its equivalent, for the purpose specified.

2. The guards or fenders *i i*, arranged, in respect to the bag *f*, substantially in the manner described.

3. The tooth-bar B and the bag *f*, and its frame, so hinged to the bars A A of the dredge, and so connected to the same by chains *m m*, or their equivalents, that the said tooth-bar and bag may be tilted, for the purpose of emptying the latter, substantially as herein set forth.

4. A frame for oyster-dredges, consisting of two bars A A, connected together, and hinged to the tooth-bar B, substantially in the manner described.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

THOMAS F. MAYHEW.

Witnesses:

JOHN WHITE,

HARRY SMITH.

T. F. Mayhew,

Oyster Dredge.

No. 97,420. Patented Nov. 30. 1869.

FIG. 1.

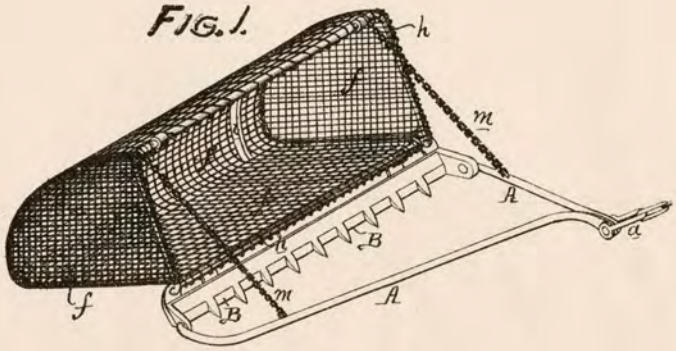


FIG. 2.

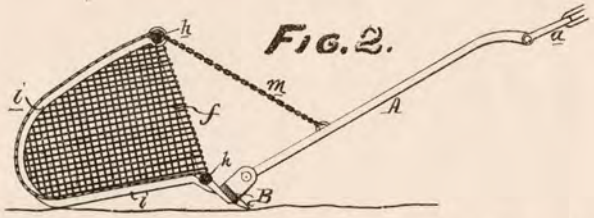


FIG. 3.

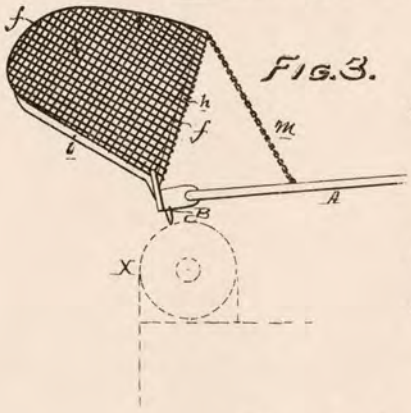
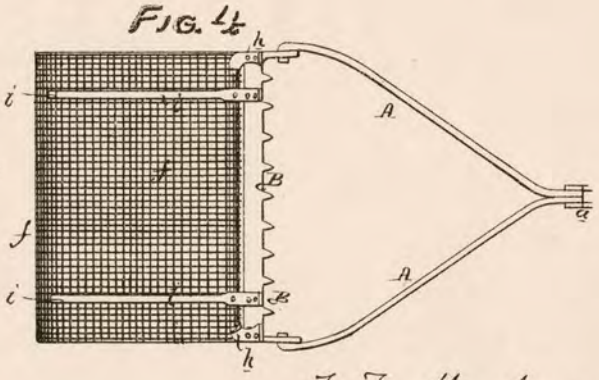


FIG. 4.



WITNESSES { Wm. A. Stuart
John Parker

T. F. Mayhew
by his Attys
Howson and Sons

(No Model.) 2 Sheets—Sheet 1.

T. THOMAS.

COMBINED DRILL AND OYSTER DREDGE.

No. 589,047. Patented Aug. 31, 1897.

Fig. 1.

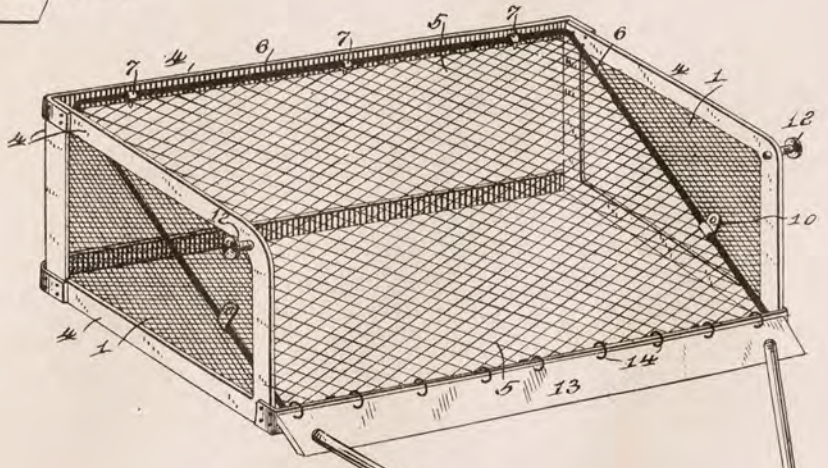
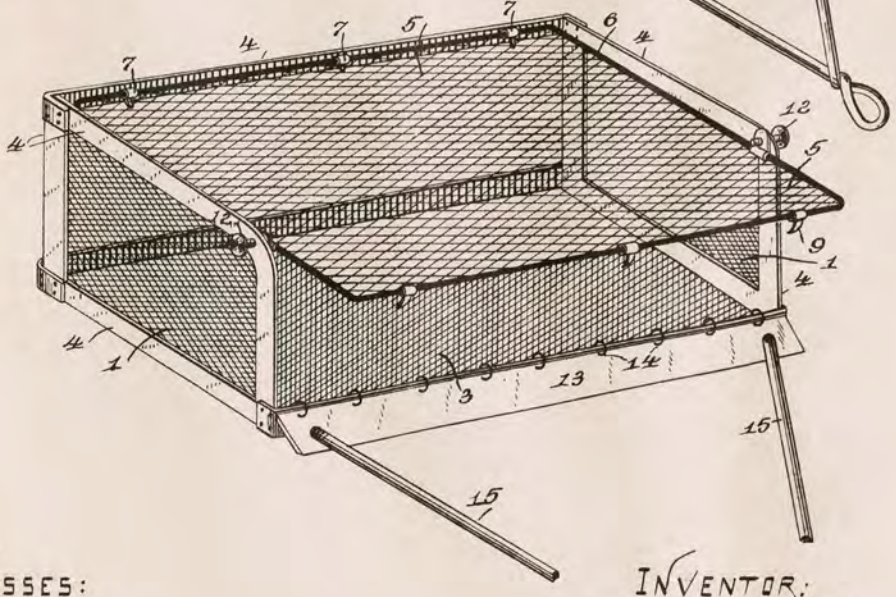


Fig. 2.



WITNESSES:
A. J. Tanner
M. J. Keane.

INVENTOR:
Thomas Thomas.
By his Atty.
Geo. D. Phillips.

(No Model.) 2 Sheets—Sheet 2.

T. THOMAS.

COMBINED DRILL AND OYSTER DREDGE.

No. 589,047. Patented Aug. 31, 1897.

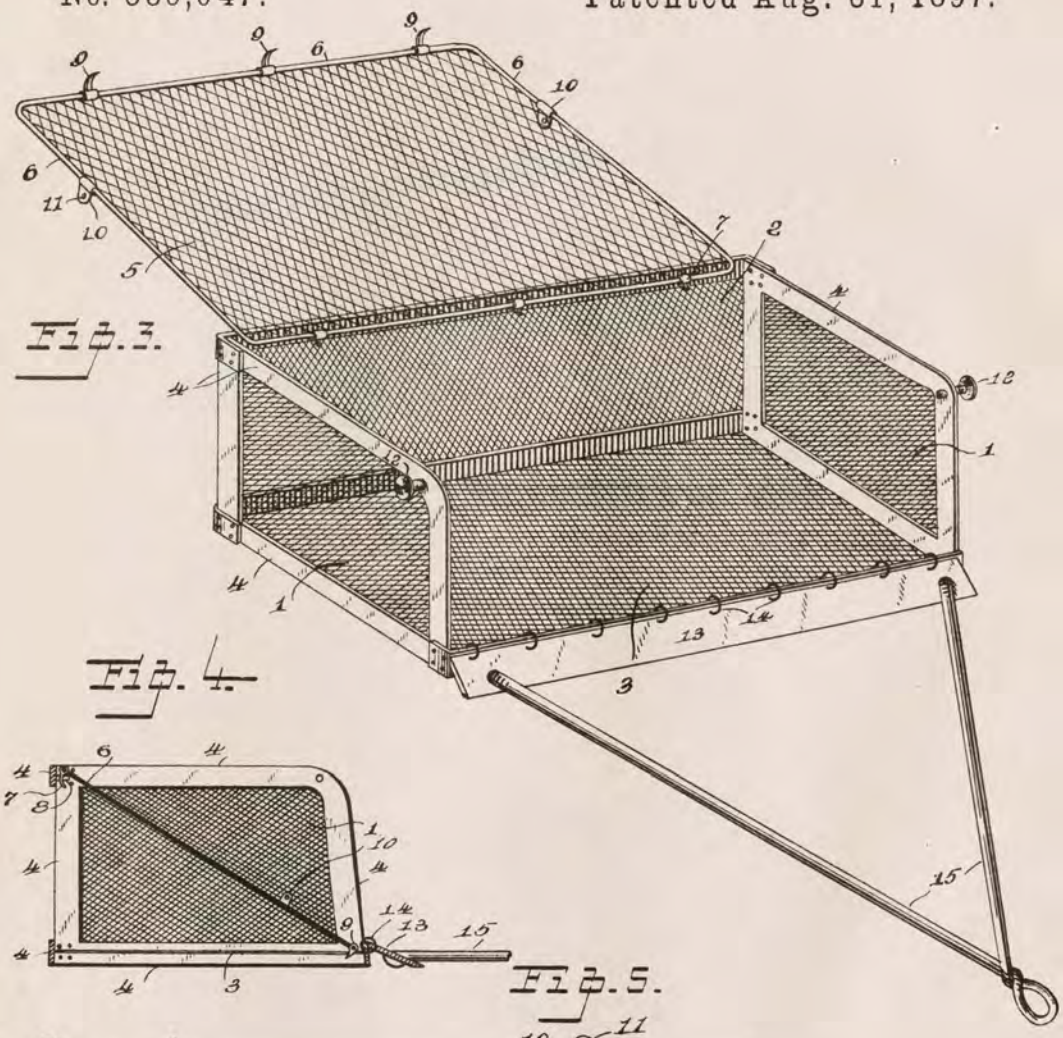


Fig. 3.

Fig. 4.

Fig. 5.

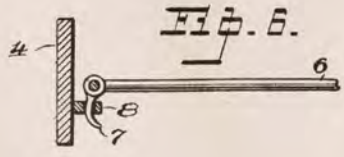


Fig. 6.

WITNESSES:
A. J. Tanner
M. J. Keane.

INVENTOR:
Thomas Thomas.
By his Atty.
Geo. D. Phillips.

UNITED STATES PATENT OFFICE.

THOMAS THOMAS, OF NEW HAVEN, CONNECTICUT.

COMBINED DRILL AND OYSTER DREDGE.

SPECIFICATION forming part of Letters Patent No. 589,047, dated August 31, 1897.

Application filed January 16, 1897. Serial No. 619,415. (No model.)

To all whom it may concern:

Be it known that I, THOMAS THOMAS, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in a Combined Drill and Oyster Dredge, of which the following is a specification.

My invention relates to a device designed to rid oyster-beds of drills or borers, and it is also adapted to take up oysters and perform all the requirements of the ordinary dredge.

Of all the enemies of the oyster with which the oyster-planter has to contend none are so destructive, by reason of their size, and therefore difficult of capture, as the "oyster-drill," a small marine gasteropod that bores holes through the shell of the oyster. Heretofore all efforts to rid an oyster-bed of these pests has resulted in failure.

My device consists of a network structure provided with a forward blade adapted to raise objects from the ground and deposit them on a screen, the meshes of which screen will allow drills to pass through into the body portion or receptacle of the dredge, while oysters and other larger objects will be carried over the screen and fall on the ground back of such dredge.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a perspective view of my improved dredge with the cover or screen dropped into an inclined position in readiness to catch drills. Fig. 2 is a perspective view of the dredge with screen elevated, in which condition the device is used to take oysters, also broken view of the draft-iron. Fig. 3 is a perspective view of the dredge with the screen thrown back. Fig. 4 is a cross-sectional view of the frame of the dredge and blade, end elevation of one end of said dredge, and one of the end frames of the screen in an inclined position, and broken view of the draft-iron. Fig. 5 is a detail end view of the screen-frame and sectional view of the upper rail of the dredge. Fig. 6 is a detail broken view of the screen-frame and sectional view of the upper rail of the dredge.

Its construction and operation are as follows:

The dredge shown is a rectangular-shaped construction, whose ends 1, back 2, and bottom 3 are made of wire-netting, bounded by the iron frame 4.

5 is the wire screen, bounded by the rectangular frame 6. This screen is detachably hinged to the upper rail of the frame of the back 2 by means of the projections 7, Figs. 4, 5, and 6, inserted in the lugs 8 of such upper rail.

9 are claws mounted on the forward part of the screen to engage with the network of the bottom of the dredge, Fig. 4, and thus prevent the screen being forced back under the weight of a body of oysters.

10 are ears mounted upon the ends of the screen-frame, and they are provided with the hole 11 to receive the ends of the threaded bolts 12, which bolts are inserted in threaded holes of the end frame of the dredge. This arrangement is used to maintain the screen in an elevated position when the dredge is used for the purpose of catching oysters.

13 is the blade fastened to the lower forward rail of the dredge-bottom by means of the rings 14.

15 is the draft-iron, attached to such blade.

In operating the device the screen is elevated, as shown at Fig. 2, and the dredge thrown over and a haul made for oysters in order to see their condition. If the work of drills appear, then the screen is lowered, as shown at Fig. 1, and the dredge returned to the bed, assuming, when in operation, the position as shown. The blade 13 will scrape the surface of the ground clean of every kind and quality of material. The stones, oysters, and other matter too large to pass through the screen will be carried up the incline and over the back of the dredge by the force of the water, while the drills will fall through the screen into the dredge and will remain there, as the meshes of the dredge-body are smaller than the drills, and from which they can be dumped out and destroyed when the dredge is hauled aboard. As the drills are heavy and pointed and the mesh of the screen is fully large enough to take in full-grown drills, which are about one inch in length, it

will readily be seen, and which has also been practically demonstrated, that they will all pass through the screen before they reach the top of the incline.

If required, the back rail of the dredge-frame may extend above the screen, as shown at Fig. 6, so as to hold any of the drills that may have passed over the screen and reached this point long enough to allow them to fall through said screen at this point, but it is extremely doubtful if any drills will be able to reach this point.

It will be understood that the size of the mesh of the screen will vary according to the ground to be worked. When the oysters are two or three years old, or more, the mesh can be made larger and reduced for smaller oysters, always, however, maintaining a mesh large enough to catch full-grown drills. For this purpose the screens are made readily attachable and detachable from the dredge, as shown and previously described. This device—*i. e.*, the woven-wire holding-receptacle—can be attached to an ordinary oyster-dredge, in which case the screen would be elevated and the wire receptacle would take the place of the bags now used for holding the oysters that pass over the blade of the ordinary dredge, in which case, also, the blade of the wire holding-receptacle could be dispensed with.

It will be observed that the screen, sides, and bottom of my device are made of woven wire. This is done because this material is cheaper and easy to obtain; but it will be understood, however, that perforated-metal plates can be substituted for such woven wire, and I hold myself at liberty to do so, without departing from the spirit of my invention. Also, if found desirable, more than one screen can be used. Also the inclination of the screen may be changed without departing from the spirit of my invention, the gist of which consists in a dredge for removing drills from oyster-grounds by lifting the drills and other matter from the surface of the ground and passing such matter over a screen, the oysters and other matter passing over the screen, while the drills fall through the same and into a receptacle for that purpose.

The object of making the sides of my dredge of woven-wire netting is that the water will readily pass through the dredge and not retard it.

The device as above described is cheap and effectual for the purpose required, and it will work equally as well on a mud bottom as a hard one.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a dredge of the character described, of a holding-receptacle and a screen overlying such receptacle adapted to retard drills and other objectionable matter and deposit them into the receptacle, and permit larger bodies to pass freely over the said screen, for the purpose set forth.

2. The combination, in a dredge of the character described, of a holding-receptacle and a screen overlying the same, and a blade or scraper to remove objects from the ground so that they may be deposited on the screen for the purpose described and set forth.

3. The combination, in a dredge, of the character described, of an open-work holding-receptacle, an inclined open-work screen of larger mesh adapted to close the mouth of such receptacle, a blade forward of said receptacle so that objects may be removed from the surface of the ground by such blade and be deposited on the said screen, the larger objects passing over while the smaller ones—like drills &c.—are forced through the mesh of the said screen into the receptacle, for the purpose set forth.

4. The combination, in a dredge, of the character described, of a network receptacle, an overlying network screen of larger mesh than the receptacle, said screen adapted to be readily attached to and be detached from said receptacle, means whereby said screen can be maintained in an elevated position, a forward blade adapted to scrape the surface of the ground, removing oysters, drills &c., therefrom which are passed over the said screen by the forward movement of the dredge when the said screen is in an inclined position, the drills and other small matter passing through the screen into the receptacle, while the larger objects will be deposited back of said dredge, as described and for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 6th day of January, A. D. 1897.

THOMAS THOMAS.

Witnesses:
A. J. TANNER,
M. J. KEANE.

March 10, 1931. B. FAGAN ET AL 1,795,768

OYSTER DREDGE

Filed Dec. 22, 1927 2 Sheets-Sheet 1

FIG. 1.

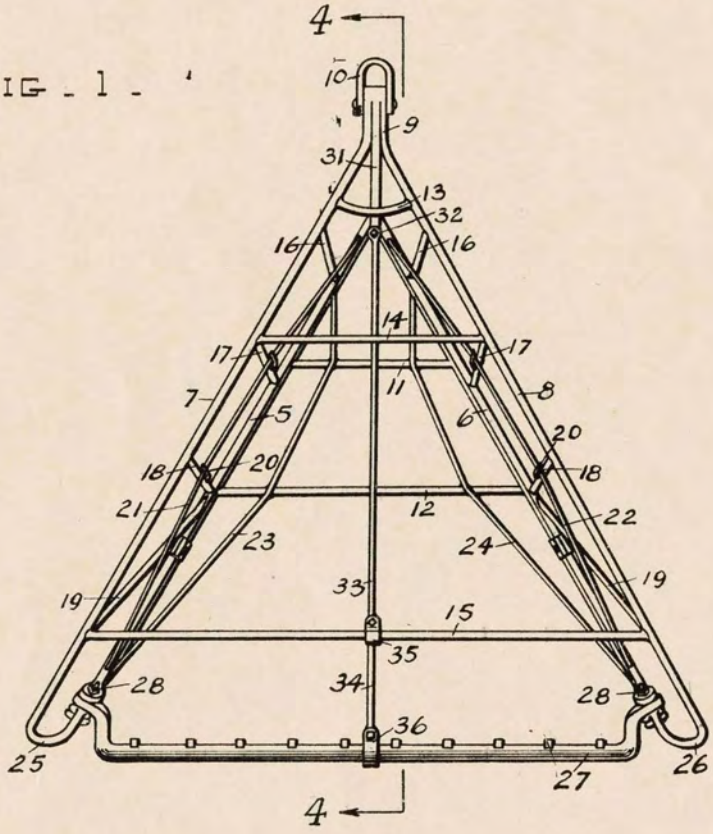
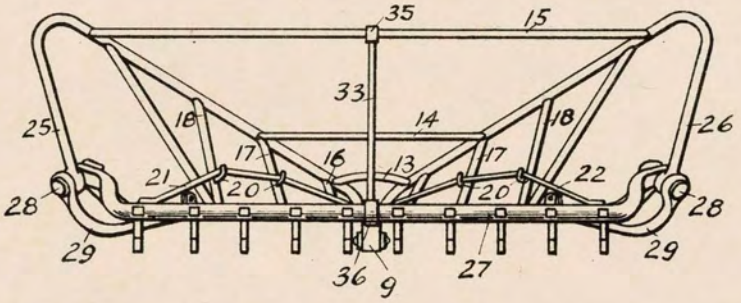


FIG. 2.



WITNESSES:

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W. P. Merrill

INVENTORS:

Boyd Fagan &

Charles Fagan,

BY

Joshua R. H. Potts

ATTORNEY

March 10, 1931. B. FAGAN ET AL 1,795,768

OYSTER DREDGE

Filed Dec. 22, 1927 2 Sheets-Sheet 2

FIG. 3.

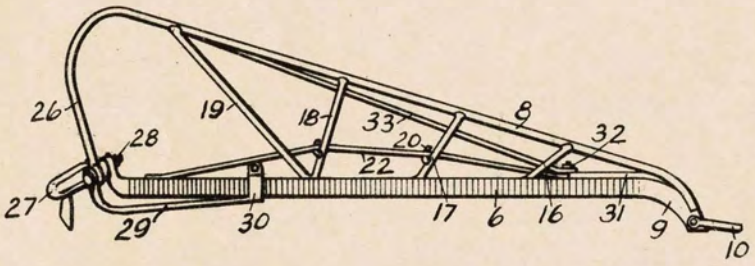
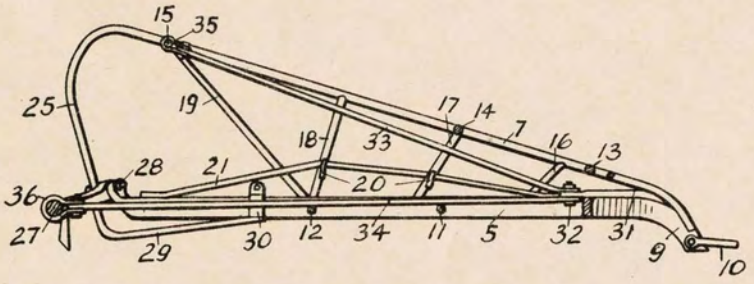


FIG. 4.



WITNESSES:

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W. P. Merriel

INVENTORS:

Boyd Fagan &

Charles Fagan,

BY Joshua R. H. Potts

ATTORNEY.

Patented Mar. 10, 1931 1,795,768

UNITED STATES PATENT OFFICE

BOYD FAGAN AND CHARLES FAGAN, OF BIVALVE, NEW JERSEY

OYSTER DREDGE

Application filed December 22, 1927. Serial No. 241,774.

Our invention relates to oyster dredges and has for an object the provision of a light, rugged dredge which possesses all the advantages of a heavy dredge without the attending objectionable features thereof.

A further object of the invention is to provide a dredge which will be prevented by its construction from landing either in the oyster bed or on the deck of a vessel other than in a right-side-up position.

A further object of the invention is to provide an increased bagging capacity for a dredge of given dredging area.

The above objects are accomplished by providing an upper and a lower frame connected together by struts, the upper frame being of greater width and length than the lower frame so as to overhang the same in all dimensions thereof and to provide side and end frames sloping from the upper frame end converging inwardly toward the lower frame, the lower frame being provided with a suitable tooth bar having teeth thereon. The particular construction may be made light by forming the same of small gauge material and connecting the same with a generous number of struts.

As an oyster bed must be dredged over several times, a heavy dredge will kill or weaken the oysters therein and it follows that a light weight dredge is of considerable importance provided that it possesses the requisite strength and rigidity and is capable of gathering the oysters.

In the drawings;

Figure 1 is a top plan view of an oyster dredge embodying our invention,

Figure 2 a rear end view thereof,

Figure 3 a side view of the dredge shown in Figure 1, and

Figure 4 a longitudinal sectional view taken on line 4—4 on Figure 1.

Briefly, our improved dredge consists of relatively light frame members, struts and braces connected to them and forming top, bottom and side frames, truss rods for holding the bottom frame members against deflection in either a vertical or lateral direction; all of which are welded together to form a light but exceptionally rigid frame; a tooth bar for loosening the oysters from the bed, and tension rods for relieving the strain of the bag on the tooth bar and rear cross bar.

Referring now in detail to the drawings, the dredge has a pair of bottom frame members 5 and 6, which are preferably rectangular in cross section, and a pair of top frame members 7 and 8, which are preferably circular in cross section, having their forward ends welded together and bent downwardly to form a neck 9, as shown in Figures 3 and 4, which is provided with a clevis 10 by means of which the dredge may be towed.

From neck 9, bottom frame members 5 and 6 diverge and have struts 11 and 12 welded between them so as to form a bottom frame. From neck 9, top frame members 7 and 8 slope upwardly and diverge from one another and have cross bars 13, 14 and 15 welded between them so as to form a top frame which is wider than the bottom frame.

This is an important feature of the invention in that it insures the landing of the dredge on board the vessel in a natural position. Much trouble and annoyance has been experienced by oystermen in the past with dredges in which the top and bottom frames are of the same width owing to the dredges landing bottom side up or on their sides which is detrimental to the lasting qualities of the dredge. The projecting top frame prevents the turning of the dredge either onto its side or onto its top side when so landing.

It is obvious from the above that the construction as set forth results in a saving of labor in turning of the dredges and prolongs the life of the dredge. By this arrangement also the considerable increase in bagging capacity of the dredge can be effected for a given dredging surface which is of decided advantage where a limitation of the dimensions of the tooth bar and of the lower frame are prescribed by law or are otherwise desirable.

It will be noted that the side frames defined by the struts connecting the top and bottom frames slope in a convergent manner from the top to the bottom frame. This

is also true of the rear end frame which is also rounded in order that should the dredge strike first on this end, the tendency thereof will be to fall forward landing with the lower frame downward. This construction will be hereinafter set forth more in detail.

Braces 16, 17 and 18 have one end of each welded to a bottom frame member, extend upwardly and outwardly and have their other ends welded to the top frame members, thus forming the side frames in each of which also a diagonal brace 19 extends from the junction of the bottom frame member and brace 18 to the junction of the top frame member and cross bar 15.

Intermediate the ends of braces 17 and 18, a suitable support for a truss rod, such as a hook 20, is provided. A truss rod 21 is supported in hooks 20 and has its ends welded to bottom member 5 and a second truss rod 22 is similarly connected to the other side frame so that the dredge is stiffened and strengthened against vertically directed loads and strains. The truss rods may, of course, be welded to braces 17 and 18 instead of employing hooks 20 or other fastening means.

A pair of truss rods 23 and 24 have their ends welded to bottom frame members 5 and 6 and their intermediate portions welded or otherwise secured to struts 11 and 12 intermediate the ends thereof so as to stiffen the dredge transversely. The effect of the truss rods is to allow the use of much lighter material in the dredge frame while producing a strong, rigid dredge which will function as efficiently as a heavier dredge without the objectionable effects on the oysters and the lighter weight permits of much easier handling.

The rear ends of top frame members 7 and 8 are bent downwardly and inwardly toward the bottom frame to form end posts 25 and 26 between the lower ends of which and the rear ends of bottom frame members 5 and 6 a tooth bar 27 is secured in any suitable manner, as by bolts 28; tooth bar 27 being preferably detachably secured to the dredge frame so as to allow its removal for sharpening or repairing its teeth.

Secured to each bolt 28 is a guide 29 having a clevis 30 formed on its forward end and encircling a bottom frame member. The bag (not shown), in which the oysters are gathered, is attached to tooth bar 27, end posts 25 and 26, cross bar 15 and guides 29.

In order to assist cross bar 15 and tooth bar 27 in supporting the weight and pull of the bag and its contacts, a draw bar 31 is welded into neck 9 and provided with an eye at its rear end for receiving a bolt 32 to which is attached, on either side of the draw bar, a back brace 33 sloping inwardly from the top to the bottom frame and a bottom brace 34 which have clevises 35 and 36 secured to their rear ends and encircling cross bar 15 and tooth bar 27, respectively.

It is to be understood that the above described embodiment of the invention is to be considered as illustrative of the principles thereof and that various changes may be made in the construction as hereinbefore outlined within the spirit of the invention as set forth in the specification and hereinafter claimed.

We claim:—

1. An oyster dredge including top and bottom frame members fastened together at their forward ends and diverging therefrom, cross bars, braces and struts joining the frame members to form the top, bottom and side frames, a tooth bar connected between the side frames, and means for stiffening the side frames whereby lighter frames may be used; the top frame being considerably wider than the bottom frame.

2. An oyster dredge including top and bottom frame members fastened together at their forward ends and diverging therefrom, cross bars, braces and struts joining the frame members to form top, bottom and side frames, a tooth bar connected between the side frames, and means for stiffening the bottom frame whereby lighter frames may be used; the top frame being considerably wider than the bottom frame.

3. An oyster dredge including a triangular bottom frame, a triangular top frame, of considerably greater width than the bottom frame, having its forward end connected to the forward end of the bottom frame and its rear ends bent downwardly and connected to the rear ends of the bottom frame, a tooth bar connected between said rear ends, braces separating each side of the top frame from the corresponding side of the bottom frame, truss rods secured to certain of said braces and to the sides of the bottom frame, struts connecting the two sides of the bottom frame, and truss rods connected to the struts and to the sides of the bottom frame.

4. An oyster dredge having a bottom frame and a top frame, spaced apart, said top frame being wider than the bottom frame.

5. An oyster dredge having spaced top and bottom frames and side members converging from the top frame to the bottom frame.

6. An oyster dredge having spaced top and bottom frames, and end and side parts, connecting the top and bottom frames and converging from said top to said bottom frame.

In testimony whereof we have signed our names to this specification.

BOYD FAGAN.
CHARLES FAGAN.

IMPRACTICAL, NEVER USED IN

CHESAPEAKE BAY

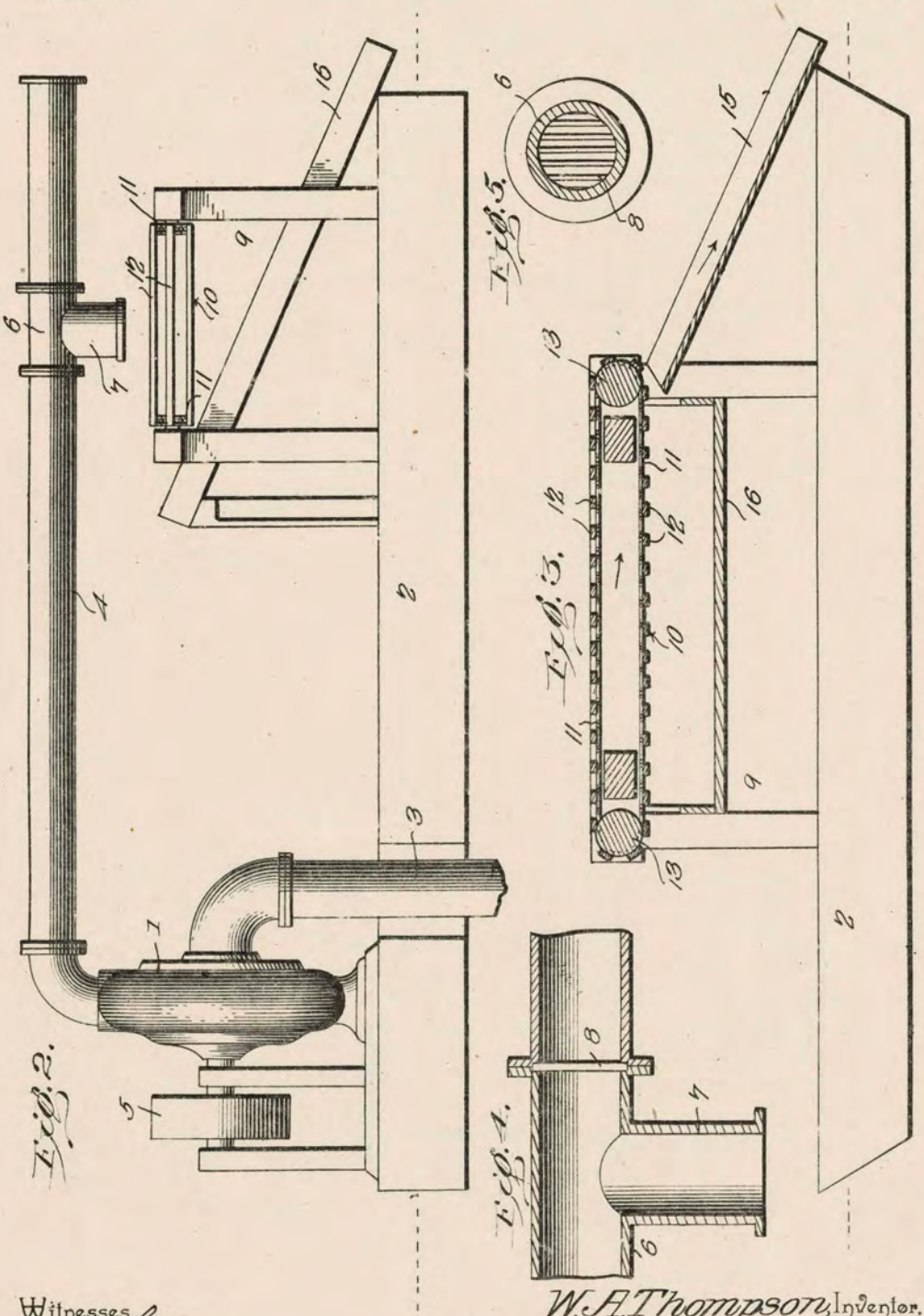
No. 705,975. Patented July 29, 1902.

W. A. THOMPSON.

CLAM OR OYSTER DREDGE.

(Application filed Oct. 28, 1901.)

(No Model.) 2 Sheets—Sheet 2.



Witnesses
E. C. Stewart
J. W. Garner

W. A. Thompson, Inventor.
by C. A. Snow & Co
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM A. THOMPSON, OF LA CROSSE, WISCONSIN.

CLAM OR OYSTER DREDGE.

SPECIFICATION forming part of Letters Patent No. 705,975, dated July 29, 1902.

Application filed October 28, 1901. Serial No. 80,301. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. THOMPSON, a citizen of the United States, residing at La Crosse, in the county of La Crosse and State of Wisconsin, have invented a new and useful Clam or Oyster Dredge, of which the following is a specification.

My invention is an improved clam and oyster dredge adapted to raise clams and oysters from the beds of rivers, bays, and streams by suction and to separate the clams and oysters from the sand and mud raised therewith; and it consists in the peculiar construction and combination of devices hereinafter fully set forth and claimed.

In the accompanying drawings, Figure 1 is top plan view of a clam and oyster dredge constructed in accordance with my invention. Fig. 2 is an end elevation of the same. Fig. 3 is partly a transverse sectional view of the same, taken on a plane indicated by the line *a a* of Fig. 1. Fig. 4 is a detail longitudinal sectional view taken through the discharge-pipe and showing the separating-screen therein. Fig. 5 is a detail transverse sectional view taken on a plane indicated by the line *b b* of Fig. 4.

In the embodiment of my invention here shown a centrifugal suction or other suitable form of pump 1 is mounted for operation on a float or barge 2, 3 being the suction-pipe, which in practice extends to the bed of the stream, bay, or other body of water on which the dredge is used, and 4 being the discharge-pipe, which leads from the said pump. For the purpose of illustration I have here shown the centrifugal pump provided with a power-pulley 5, by which it may be driven. The discharge-pipe 4 is provided at a suitable distance from its outer end with a member 6, coupled therein, which member 6 is provided with a vertical discharge branch 7. A separating-screen 8 is located and secured in the discharge-pipe at a suitable distance beyond the discharge branch 7. As here shown, the said separating-screen comprises a series of bars spaced apart a suitable distance to prevent the shells of clams or oysters from passing between them. Within the scope of my invention, however, said screen may be of any suitable construction, and I do not desire to limit myself in this particular. A suitable frame 9 is shown on the barge or float, over which frame the discharge-pipe 4 extends, and in the said frame is an endless movable separating-screen 10. The same is here shown as composed of a pair of endless chains 11, connected together by transversely-disposed bars 12, which are appropriately spaced apart to prevent clam or oyster shells from passing between them, and suitable revoluble elements, here shown as rollers 13, which have their bearings in the sides of the frame 9 and which carry the said chains 11. For the purposes of illustration I have here shown one of the rollers 13 provided with a power-pulley 14, by means of which the said endless movable screen 10 may be caused to operate in the direction indicated by the arrows in Figs. 1 and 3, whereby the said endless movable screen is caused to carry the clam and oyster shells discharged thereon to a chute or inclined plane 15, adapted to discharge the same into a barge or other suitable receptacle or vessel. A mud-chute 16 is disposed transversely under the endless traveling carrier-screen 10 and is adapted to discharge material overboard.

In the operation of my invention the clams and oysters raised from the bed, together with a quantity of sand, mud, or silt, and a volume of water by the pump and discharged therefrom through the pipe 4, are separated from the foreign matter by the screen 8 and discharges through the branch discharge 7 onto the endless traveling carrier-screen 10. A portion of the foreign matter is discharged directly overboard from the pipe 4, and such of the foreign matter as is discharged upon the endless traveling carrier-screen is washed and separated from the clams or oysters and falls through the said carrier-screen onto the mud-chute 16, which discharges the same overboard, while the clams or oysters which have been separated from the foreign matter by the action of the stream of water from the pump and the screens 8 10 are discharged from the latter onto the chute 15, as will be readily understood.

My invention is particularly adapted for dredging the clam-beds of the Mississippi river and other streams from the shells of which the so-called "pearl" buttons are made. Heretofore these clams have been

raised by fishermen by hooks and lines, and such dredges as have been tried for doing the work have been discarded, because it was found more costly to pick out the shells from the mud and sand with which they were commingled than to obtain the shells in the manner above stated. My improved dredge separates the mud and foreign matter from the shells, and hence avoids this objection.

Having thus described my invention, I claim—

1. A dredge having a discharge-conduit provided with a depending discharge branch, and a screen beyond the latter, whereby material carried through the conduit to the screen, will by its own gravity drop through the depending discharge branch, substantially as described.

2. A dredge having a discharge-conduit provided with a discharge branch and a screen beyond the latter, in combination with a screen onto which said branch discharges, substantially as described.

3. A dredge having a discharge-conduit provided with a discharge branch and a screen beyond the latter, in combination with an endless traveling carrier-screen onto which said branch discharges, substantially as described.

4. A dredge having a discharge-conduit provided with a discharge branch and a screen beyond the latter, in combination with a carrier-screen onto which said branch discharges, a chute under said carrier-screen to discharge the material that passes through the latter and a chute on which the material carried by said carrier is discharged by the latter, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM A. THOMPSON.

Witnesses:
J. F. McDONOUGH,
GERTRUDE HUBBARD.

T. B. WEBSTER.

OYSTER DREDGE.

APPLICATION FILED FEB. 18, 1909.

929,355.

Patented July 27, 1909.

2 SHEETS—SHEET 1.

Fig. 7.

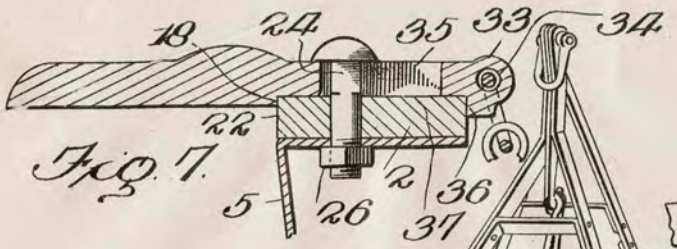


Fig. 8.

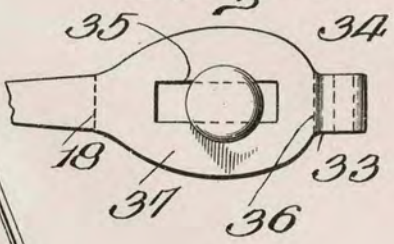
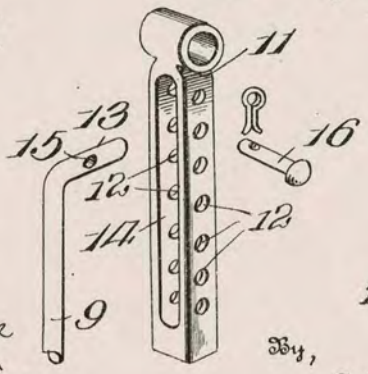


Fig. 1.

Fig. 9.



Witnesses

W. A. Williams

J. C. Spence

Inventor

Thomas B. Webster

By,

Stewart & Stewart Attorney's

T. B. WEBSTER.

OYSTER DREDGE.

APPLICATION FILED FEB. 18, 1909.

929,355. Patented July 27, 1909.

2 SHEETS—SHEET 2.

Fig. 2.

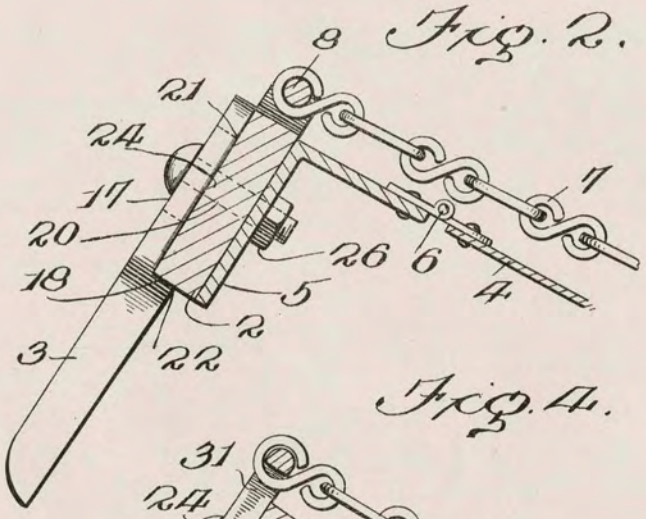


Fig. 4.

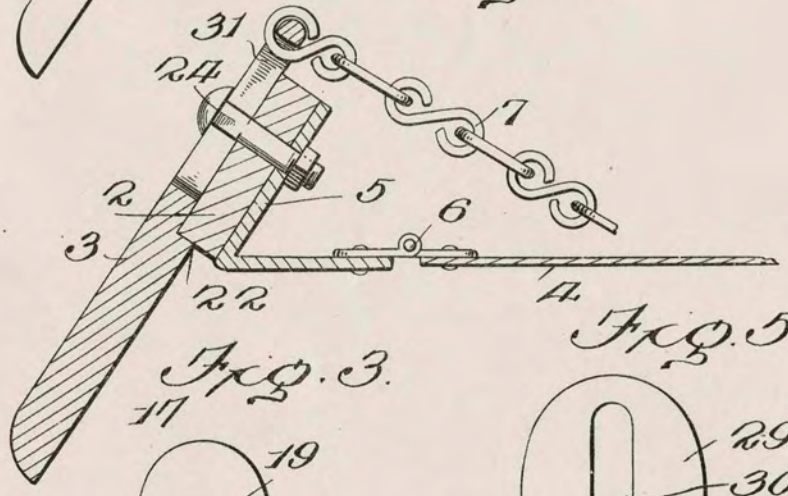


Fig. 5.

Fig. 3.

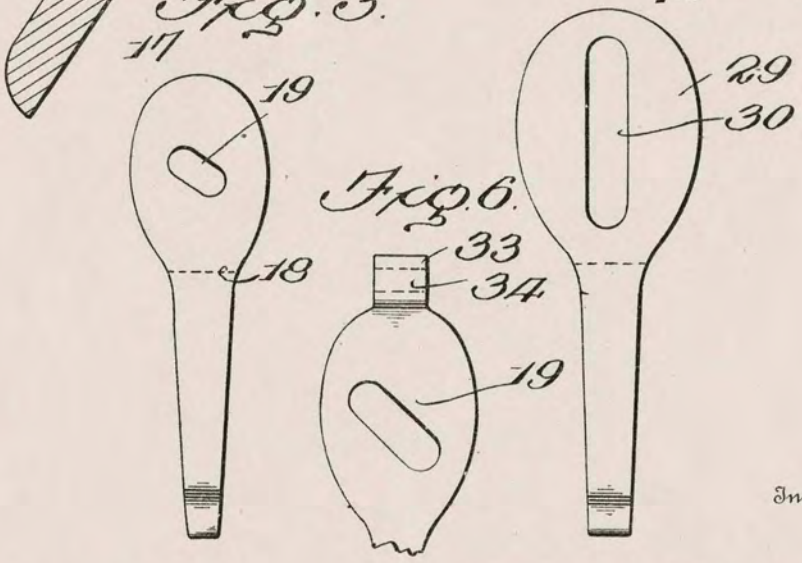


Fig. 6.

Inventor

Witnesses

W. A. Williams

J. F. Mc Guire

Thomas B. Webster.

By,

Stewart & Stewart Attorney's

UNITED STATES PATENT OFFICE.

THOMAS B. WEBSTER, OF BALTIMORE, MARYLAND.

OYSTER-DREDGE.

No. 929,355. Specification of Letters Patent. Patented July 27, 1909.

Application filed February 18, 1909. Serial No. 478,717.

To all whom it may concern:

Be it known that I, THOMAS B. WEBSTER, a citizen of the United States of America, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Oyster-Dredges, of which the following is a specification.

This invention relates to oyster dredges. Such dredges as now in use in the art consist of a frame having a transverse blade armed with teeth. In the rear of the blade is a chain bag secured to the frame, with its mouth distended. The dredge is adapted to be drawn over the bottom, the teeth extending down to engage the oysters and tear them from the rocks or other bottom formation to which they are attached. The bag is placed to catch the oysters as they are removed and serves to hold them and all other solid material which is turned up by the teeth. In the dredges as now built, the teeth are made of wrought iron and each tooth is supplied with a pin which is integral therewith and generally at right angles to the length of the tooth. The blade is provided with an aperture to receive the pin of each tooth and the teeth are secured in place by heating them to a high temperature, passing each pin through the corresponding hole in the blade, and heading it over. The operation of mounting the teeth on the blade is one that must be performed by a blacksmith at a considerable expense, and as the teeth of a dredge are subject to such wear that they must be replaced after each trip, the blacksmith work on the dredges is a very considerable item of expense in harvesting oysters. Another defect of the dredges in use is that the chain bags which hold the oysters are allowed to drag on the bottom with their load, and as the oyster beds are very rough and covered with jagged stones, the life of the bags is always short, and they frequently break when loaded and cause a loss of the oysters which have already been gathered. With the dredges now used, it is an incident of each haul that when the bag becomes partly loaded, the teeth are pushed down into the mud or shells, so that while the oysters in the bottom of the bag are clean, those later dredged are mixed with a large proportion of mud and stones or shells. It also frequently happens that in throwing the dredge overboard, the chain bag becomes caught on the teeth and its capacity thus reduced, so that at the end of the haul it is found that very few of the oysters which have been displaced from the bottom are in the bag, the rest having been wasted.

To overcome the first difficulty and reduce the cost of blacksmithing, I have provided a tooth which may be easily removed and secured in place by the oystermen without the service of a blacksmith. This tooth is provided with a shank, shown as flattened, to engage a face of the blade, and slotted longitudinally or diagonally to receive a bolt which passes through the blade and shouldered transversely to engage one and preferably both edges of the blade to prevent side motion. The blade is apertured to receive the bolt of each tooth and the length of the slots in the tooth shanks makes accurate placing of the bolt holes in the blade and finishing of the blade unnecessary. To protect the bag and overcome the other difficulties referred to, I have provided a thin plate which is secured to the blade and extends to the rear beneath the bag to maintain it out of contact with the bottom. This plate not only protects the bag, but it serves as a guard to prevent the teeth and blade from being sunk into the bottom, so as to scrape up mud and shells, and reduces the strain on the bag so that economy may be exercised in using lighter chains and hooks to form the bag. The plate prevents the bag from swinging down and forward against the teeth, so that fouling of the bag on the teeth is obviated. The applicant's plate is also of use in dumping the oysters. The dredge is drawn up over a roller on the side of the boat and moved forward until the rear of the plate rests on the roller and the nose of the dredge on the deck. In this position, the plate is tilted forward and the oysters may be easily removed. In order to conform to different conditions of bottom, the plate may be hinged and made adjustable.

The applicant is aware that numbers of dredges have been produced and patented in which a rigid cage is substituted for a bag. Such cages have never come into common use by the oystermen because they must be made exceedingly cumbersome and heavy in order to support the heavy loads of oysters which are handled at each haul. Light material, as wire netting, when supported upon a rigid frame soon yields to the weight of the oysters within and the contact with the rough bottom without. The device which has been universally adopted by

the oystermen to hold the catch while the teeth are being hauled over the bed is a chain bag, generally composed of S hooks and rings. It is to the support and protection of this bag that the applicant's plate is intended to be applied.

An oyster dredge to which my invention has been applied is illustrated in the accompanying drawings:

Figure 1 is a perspective view of the dredge; Fig. 2 is a fragmentary cross-section through the blade, plate and bag, showing a tooth in elevation; Fig. 3 is a front elevation of a tooth detached; Fig. 4 is a sectional elevation of another modification of my device; Fig. 5 is an elevation of the tooth used therewith; Fig. 6 is an elevation of a slightly different tooth; Fig. 7 is a longitudinal section of another type of tooth; Fig. 8 is an elevation of the same; Fig. 9 shows details of the plate adjusting means, grouped to indicate their coöperative relation.

Referring to the drawings, the dredge consists of a suitable frame 1 having a transverse bar or blade 2 on which are mounted the depending teeth 3 and to which the plate 4 is secured. As shown, an angle iron 5 on the rear of the blade carries hinges 6, also attached to the plate, so the latter swings in a vertical plane. The bag 7 shown as resting on the plate, is attached at its mouth to the frame, the lower edge of the mouth of the bag being shown in Fig. 2 as engaging a rod 8 which extends across the dredge just above the blade 2. If the plate be hinged, some means must be provided to hold it in adjusted position. The preferred means is shown in the form of bows or bands 9. One end of each band is shown as secured to the plate near its rear portion, and from this point the bands extend back and up over the bag. The upper extremities of the bands are adjustably secured to the frame, preferably in the manner to be described. The transverse rod 10 to which the upper edge of the bag is attached is provided with slotted lugs 11, pierced with a series of holes 12. The end of each band 9 is turned up vertically at 13 and the member 13 passed through the slot 14. The member 13 is pierced at 15 to admit the pin 16 passed through a hole 12. In this way the plate is made adjustable by moving the end 13 of the bands in the slots and pinning them. This allows the position of the plate to be changed to suit different conditions of dredging.

Having reference to Figs. 2 and 3, it will be noted that the blade 2 is shown as rectangular and the shanks of the teeth are flattened at 17 and shouldered transversely near the teeth proper on their rear sides at 18. The flat shank of each tooth is slotted diagonally at 19 and the blade is apertured at 20 with holes, one corresponding to each tooth. To mount the teeth, each one is placed on the blade with its rear flat surface 21 on the front surface of the blade, and the shoulder 18 is pressed against the lower face 22 of the blade. A bolt 24 is passed through the slot of the tooth and through the corresponding hole 20, and the nut 26 is tightened on the bolt, holding the tooth in place with the shoulder 18 in close contact with the lower surface 22 of the blade. It will be noted that the length of the slot 19 provides for the positioning of the tooth with its shoulder in contact with the blade and makes it unnecessary to finish the blade or remove irregularities from its surface in order to secure a rigid setting of the teeth.

The angle iron 5 to which the plate 4 is hinged may be turned either down, as shown in Fig. 2, or up, as shown in Fig. 4. One flange of each angle iron, apertured with holes to correspond to and register with those of the blade, is placed against the rear surface of the latter and the bolts 24 which have been described as holding the teeth, are passed through the plate and flange and the nuts 26 are screwed onto the bolts in the rear of the flange. In this way, a single set of bolts is made to hold both the teeth and the plates to the blade. In Figs. 4 and 5, I have shown the shank 29 with the slot 30 therein extending above the blade. This projecting portion of the shank forms an eye 31 to which the lower portion of the mouth of the bag may be secured. Fig. 6 shows a tooth shank slotted diagonally and provided with a lug 33 apertured at 34 to form an eye for the same purpose as eye 31.

Figs. 7 and 8 illustrate still another type of tooth fastening. The shanks of the teeth of the style shown in these figures are flattened at 37 to engage the blade face and slotted longitudinally at 35, as described in connection with Figs. 4 and 5, but the slot preferably does not extend above the blade. The end of the shank is provided with a lug 33 apertured at 34 to engage the bag. To prevent the tooth from working loose, I have provided, in addition to the shoulder 18 engaging the lower edge 22 of the blade, a shoulder 36 engaging the upper edge of the blade. The bolt is shown as passed through the tooth and plate and angle iron, but of course the teeth described may be used without the protecting plate and angle iron.

The operation of my device will be apparent from the foregoing description of its construction and the statement of its function. In connection with this description, I would have it understood that while I set forth numerous minor details of the dredge to which my device has been applied, I do not desire to limit myself to these details, but

What I claim and desire to secure by Letters Patent is:

1. In an oyster dredge having a tooth blade, a tooth to be removably and rigidly secured to the blade, the tooth having a flattened shank and two transverse shoulders on the shank to engage the blade from above and below the shank between the shoulders being slotted to receive a bolt.

2. In an oyster dredge having a tooth blade, a tooth to be removably and rigidly secured to the blade, the tooth having a flattened shank shouldered transversely to engage the blade on two opposite edges, the shank between the shoulders being slotted to receive a bolt, the upper end of the shank having an eye to be engaged by the bag.

3. In an oyster dredge, a frame having teeth and a bag, the mouth of the bag secured to the frame, the bag otherwise hanging free and extending to the rear, a plate pivotally mounted on the frame and extending to the rear beneath the bag, and means for securing the plate in adjusted position.

4. In an oyster dredge, a frame including a transverse blade and teeth, the latter secured to the blade, a flexible bag, the mouth of which is secured to the frame in distended position, a plate which normally rests on the bottom extending to the rear of the blade to support the bag, and a band secured to the rear of the plate extending upward and inclosing the rear of the bag.

5. In an oyster dredge, a frame including a transverse blade and teeth, the latter secured to the blade, a plate pivotally mounted on the frame, the body of the plate extending to the rear, a flexible bag, the mouth of which is secured to the frame and which hangs freely on the plate, protected thereby from the bottom, and bands secured to the rear of the plate bent up to inclose the rear of the bag and adjustably secured at their upper extremities to the frame.

6. In an oyster dredge, a frame having a support for teeth, a tooth having a flattened shank shouldered transversely to engage the edge of the support, the shank slotted beyond the shoulder, and, at its extremity, provided with an eye to which a dredge bag may be fastened.

7. In an oyster dredge, a frame having a support for teeth, a tooth having a flattened shank shouldered transversely to engage the edge of the support, the shank slotted beyond the shoulder, the shank, at its extremity, provided with an eye to which the dredge bag may be fastened, and a bolt passing through the slot to secure the tooth to the support.

Signed by me at Baltimore, Maryland, this 15th day of February, 1909.

THOMAS B. WEBSTER.

Witnesses:

EDWARD L. BASH,

S. RALPH WARNKEN.

IMPRACTICAL, NEVER USED IN

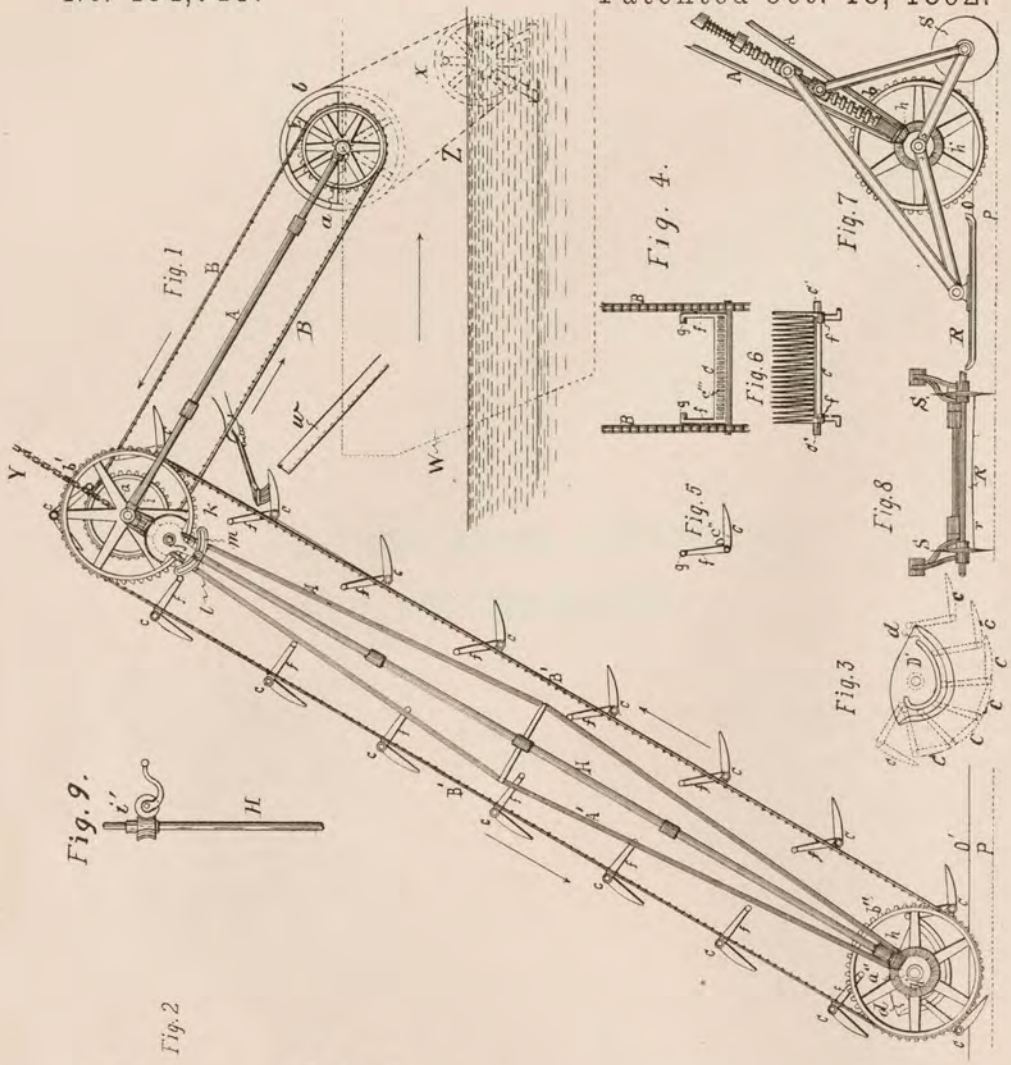
CHESAPEAKE BAY

(No Model.) 2 Sheets—Sheet 1.

H. R. HILTON & J. E. WILSON.

CLAM OR OYSTER RAKE OR DREDGE.

No. 484,715. Patented Oct. 18, 1892.



Witnesses
Lillie Hamma
Chas. Monm

Inventors
Henry R. Hilton
James E. Wilson

By their Attorneys
Knight Bros

(No Model.) 2 Sheets—Sheet 2.

H. R. HILTON & J. E. WILSON.

CLAM OR OYSTER RAKE OR DREDGE.

No. 484,715. Patented Oct. 18, 1892.

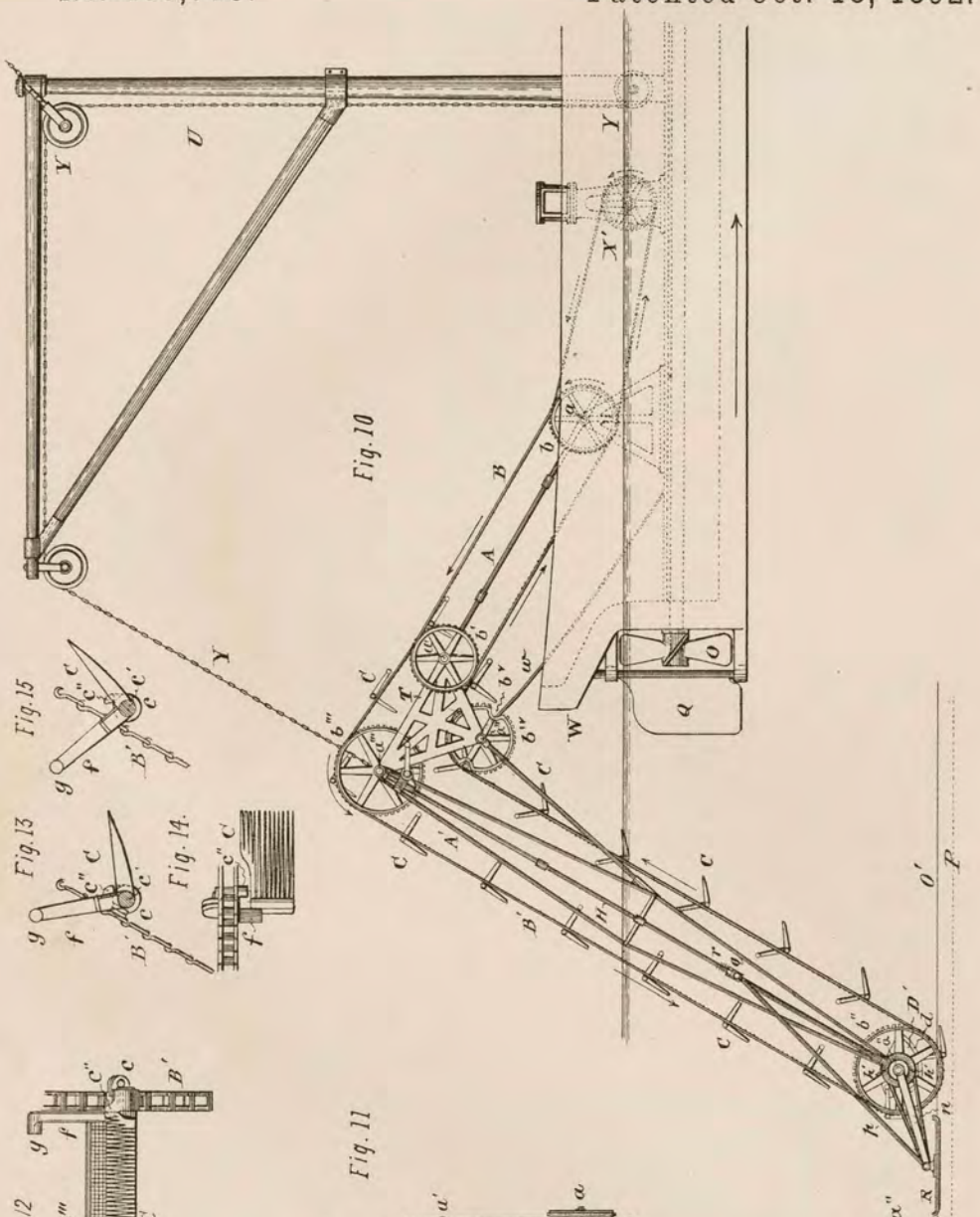


Fig. 10

Fig. 15

Fig. 13

Fig. 14.

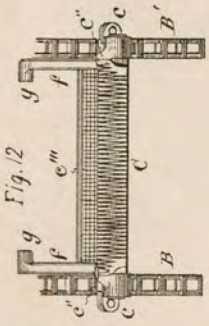


Fig. 12

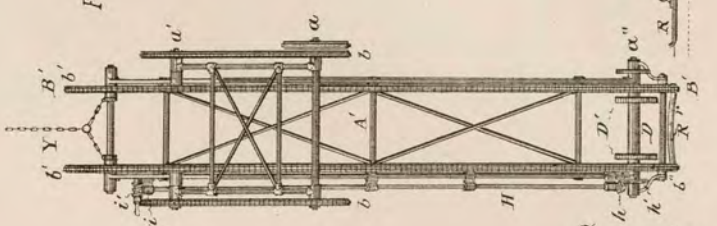


Fig. 11

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UNITED STATES PATENT OFFICE.

HENRY R. HILTON, OF JERSEY CITY, NEW JERSEY, AND JAMES E. WILSON, OF NEW YORK, N. Y.

CLAM OR OYSTER RAKE OR DREDGE.

SPECIFICATION forming part of Letters Patent No. 484,715, dated October 18, 1892.

Application filed August 1, 1891. Serial No. 401,437. (No model.)

To all whom it may concern:

Be it known that we, HENRY R. HILTON, of Jersey City, county of Hudson, State of New Jersey, and JAMES E. WILSON, of New York, county and State of New York, citizens of the United States, have jointly invented a new and useful Clam or Oyster Rake or Dredge, of which the following is a specification.

Our invention belongs to the class of dredging and excavating devices which employ a series of rakes or scoops attached to one or more endless chains which are stretched around sprocket-wheels rotated by any suitable power.

Our invention relates to a provision to enable the gathering and raising from ocean-beds or water bottoms of any substances lying thereupon or embedded therein, the provision being more particularly intended for the gathering of clams and oysters.

Our invention can also be utilized for scarifying or "cultivating" such bed-surface preparatory to the planting of oysters or other shell-fish therein.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of an apparatus embodying a simple form of our invention. Fig. 2 is a front elevation of the same, the endless chains and their attached rakes being omitted. Fig. 3 is an inside view of one of the rake-deflecting cams. Fig. 4 is a front view of one of the rakes and portions of the carrying-chains. Fig. 5 is a side view of a rake-tooth. Fig. 6 is a top view of the same. Fig. 7 is a side view showing foot and colter attachments. Fig. 8 is a front view of said colter and foot. Fig. 9 represents a modification of the cam adjusting and locking mechanism. Fig. 10 shows by side elevation a form of our dredge slightly differing from that shown in Fig. 1. Fig. 11 is a front elevation of the "boot" of such dredge, omitting the rakes. Fig. 12 is a top view of a rake. Fig. 13 is an inner side view of one of the rakes in its socket, together with a portion of one of the endless chains. Fig. 14 is a top view of the same. Fig. 15 represents the rake in an up-tipped position.

W may represent a scow or other water-craft.

A A′ is the frame of the machine, shown as constructed of ordinary water-piping, braced with rods, and supporting at its ends and at an intermediate point shafts $a\ a'\ a''$, the last-named preferably non-rotative. On this shaft the revolving parts are sleeved. The intermediate shaft a' also serves as the axis of a hinge, for the purposes hereinafter explained.

$b\ b'\ b''$ are sprocket-wheels.

B B′ are endless chains or belts, of which the chains B′ carry a series of forwardly pointing or directed rakes, scoops, or combs C by means of sockets or ears c, attached to the links of said chain. These sockets constitute bearings for the rake-trunnions c'.

c''' represents a grated back, which while permitting escape of mud and water serves to retain the oysters or other matter which it is desired to elevate.

Sleeved upon shaft a'' are side cams D′, connected by the sleeve D. The office of these cams is to control the position to be assumed by the rakes while passing around the lower sprocket-wheels b'', being drawn by the endless chain to which they are journaled.

By reference to Figs. 4, 5, 6, 13, 14, and 15 it will be seen that the trunnions c' form the axes about which each rake is at liberty to vibrate upward in said sockets, but is prevented from depression below a horizontal position in its loaded and ascending condition by stops or lugs c'' on the sockets against which the rake-arms f are brought to rest. In order to secure the desired vibration, each rake has two arms f, that terminate with inwardly-extending lugs g, which occupy eccentric grooves d in the cams D′, and thus serve to direct the rake-points so as first to secure the proper penetration of the sea-bed and then to emerge from the bed in the horizontal position best adapted to retain and carry up the load or "take" thus collected. (See Figs. 1 and 3.)

To enable the person in charge to adjust the cams D′ for a greater or less rake penetration while the boot is submerged, we provide the following means: H is a shaft supported in bearings in the plane of shafts

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a' a'' and carrying at its lower end bevel-pinion h, which engages with bevel-gear h', which is rigidly attached to the shaft a'', carrying sleeve D. The shaft H carries at its upper end a like bevel-pinion i, which engages in a cogged segment j, that can be made fast to the frame by means of an arm k, which carries a nutted bolt l, that traverses a slotted plate m upon the frame.

The shaft a and its attached sprocket-wheels b are driven by any suitable means—such as chain or belt connection Z—either with a hand-winch X, Fig. 1, or with a steam-engine X', Fig. 10, which may be the engine which is employed to propel the scow W through the instrumentality of any suitable propeller O, the scow being kept head-on by a rudder Q.

In the form above described the contents of the rakes may be removed by an instrument in the hands of an attendant, as shown in Fig. 1.

The above-described form or type of our invention is susceptible of various modifications. For example, there may (see Fig. 10) be a forward extension T of the frame which carries the shaft a'' that does duty as the hinge between the two main parts of the frame. Associated with this are two additional shafts a''' a^{IV}, which carry "idle" sprocket-wheels b''' b^{IV}. Indentations b^{V} in the periphery of the sprocket-wheel b^{IV} permit the passage of the rake-sockets in the manner shown. By this arrangement the rake-chains as they reach the point of discharge are deflected forward and downward, as shown in Fig. 10, so as to dump or discharge the take onto a suitable chute w, which conducts the matters into the scow. A crane U, furnished with suitable tackle Y, enables the person in charge to suspend the machine at any desired height and position. In some cases an adjustable foot or drag R (having, preferably, the transversely-concave sole r) may be employed to limit the penetration of the rakes. Both foot and a colter, to be hereinafter described, may be attached to and adjusted simultaneously with the gearing h', as shown in Fig. 7, or, as shown in Fig. 10, said foot may depend from an arm n, that vibrates loosely about shaft a'' and be forced and held downward by a rod p, whose upper end bears against a nut q on a screw r upon the shaft H.

S, Fig. 7, shows a colter, also adjustable, which may be associated with such foot.

i', Fig. 9, shows a worm movement for use instead of the parts i j k l m.

The operation of the machine is as follows: It being placed in position as shown in Fig. 1, the lower or boot end resting upon the surface of water bottom, sufficient weight having attached to it to resist the thrust of the rakes, the upper or boat end being attached to a suitable frame on said boat or float, the outboard or hinged portion being supported by suitable rigging Y, power is applied by means of a hand-winch, a steam-engine crank-shaft, or any other convenient rotary motion to sprocket-wheel E, thence *via* endless chain or belt B in the direction indicated by arrows, and through shaft a' to the endless chain or belts B', carrying rakes or combs c c, &c. As the rakes approach cams D' D' the lugs g g enter the cam-grooves, thus converging or diverging the points, as may be most desirable. Straight line O' represents the bed-surface, upon which the boot rests. Dotted lines P represent the depth below said surface to which it is desired the rake-teeth shall penetrate. Should it be desirable to thrust the blades or teeth of the rakes to a greater or less distance below the surface, it is accomplished by adjustment of cams D' D', as explained above. The position of the cam-grooves in relation to the center of rotation of the rakes is such that the rake-teeth assume nearly a horizontal position as they pass the lower center and remain in that position through the remainder of their revolution about the sprocket-wheels b''. Said teeth are thus caused to penetrate the ground, and by remaining in such relative position whatever they may have gathered is elevated and delivered above the surface of the water. Clams lie a few inches under the surface; oysters on the surface; roots of vegetables penetrate below the surface. Much refuse is often on the surface, and by the means of the adjustment above described the take of the rakes is at all times under the control of the operator. A forward movement of the float, as indicated by arrow, carries forward the machine, which, being weighted at the bottom, will always preserve about the same relative position. It being hinged, rise or fall of the tide, waves, or greater or less depth of water within certain limits is provided for. The main frame may be made extensible and by lengthening or shortening the same, as well as the chains or belts, as great range of depths may be provided for as desirable.

For use on mud bottom when the boot end would be liable to sink too deep it is proposed to attach a shoe or foot R to the frame extending to the rear of the boot, which, dragging on the bed and covering a large surface, shall prevent deeper penetration than is desired. It may be found desirable in some cases to also attach to the lower end of the frame suitable blades, preferably in the form of revolving disks or colters S, which shall be extended ahead of the general movement of the machine to cut the ground to depth being worked, the same as is used on turf-plows. The said shoe R and colters S are preferably arranged and connected to the foot-frame in the manner shown in Figs. 7 and 8 or as in Figs. 10 and 11.

Having thus described our invention, the following is what we claim as new therein and desire to secure by Letters Patent:

1. The combination, with a self-propelled scow, of a rotary submarine rake or dredge having the frames, substantially as shown and

described, with endless chains armed with tines which engage the water bed in the direction of travel of the scow, constructed and operated substantially as set forth.

2. The combination of the hinged frame A A′ with a rotary dredge or elevator in which the positions of the buckets, rakes, or combs are controlled by the cam or cams D within the boot of same, substantially as described.

3. In a rotary dredge or elevator, the combination of the hinged frame A A′, the endless elevator having teeth adjustable in pitch or angular presentation with the adjustable cam or cams, substantially as described.

4. In a rotary dredge or elevator, the combination, with a scow, of the hinged frame A A′, the endless chain or belts B, armed with tines, rakes, or combs *c c*, pointed in direction of travel of the scow, and the adjustable cam or cams D′, substantially as described.

5. In a rotary dredge or elevator, the combination of hinged frame A A′, endless chain or belts B, the forwardly-directed rakes or combs *c*, cam or cams D′ D′, operating-gears *h* and *h′*, shaft H, pinion *i*, and segment *j*, substantially for the purpose as described.

6. In a submarine dredge or elevator, the combination of the frame A A′, endless chain or belt B, and forwardly-directed rakes, teeth, or combs *c*, with the arms *f* and the stops *c″*, substantially as described.

7. In a submarine dredge or rake, the combination of the frame A A′ and the endless revolving chains armed with tines, with the foot or drag attached to the lower end of the frame, for the purposes set forth.

8. In a submarine dredge or rake, the combination, with a scow, of the frame A A′, rotatable endless chains armed with tines, and the cutting disks or colters, substantially as described.

9. In a submarine dredge, the combination, with a supporting and dragging scow provided with frame A A′ and belt B, of the boot or outer hinged frame having the forward and downward projection T, in combination with the rake-bearing chains B′, the driving sprocket-wheel *b′*, and the "idlers" *b‴ b*.

10. In a submarine dredge having the supporting and dragging scow, the combination of the frame A A′, the belt B, the endless elevator B′, having forwardly-directed teeth or tines C, shaft *a″*, loosely-vibrating arm *n*, rod *p*, nut *q*, and screw-threaded shaft H *r*.

11. In an oyster-dredge, the combination of the frame A A′, belt B, endless chains B′, having the forwardly-directed teeth or tines C, the attached sockets *c*, having stops or lugs *c″*, and the vibratable rakes C, having arms *f*.

12. In combination with the oyster-dredge, substantially as hereinbefore shown, the boot, and the foot R, having transversely-concave sole *r*.

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